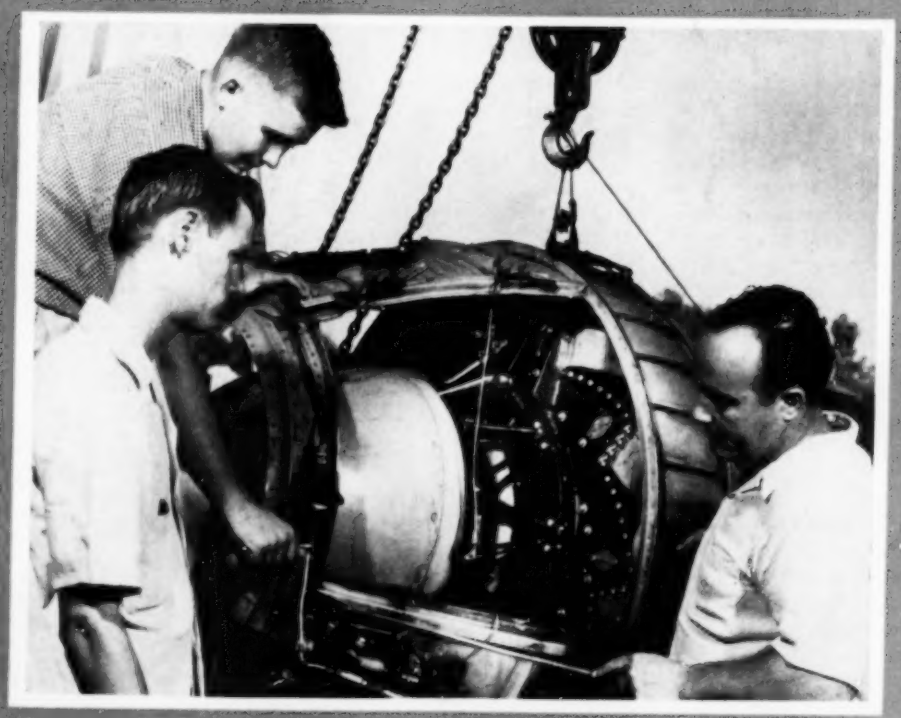
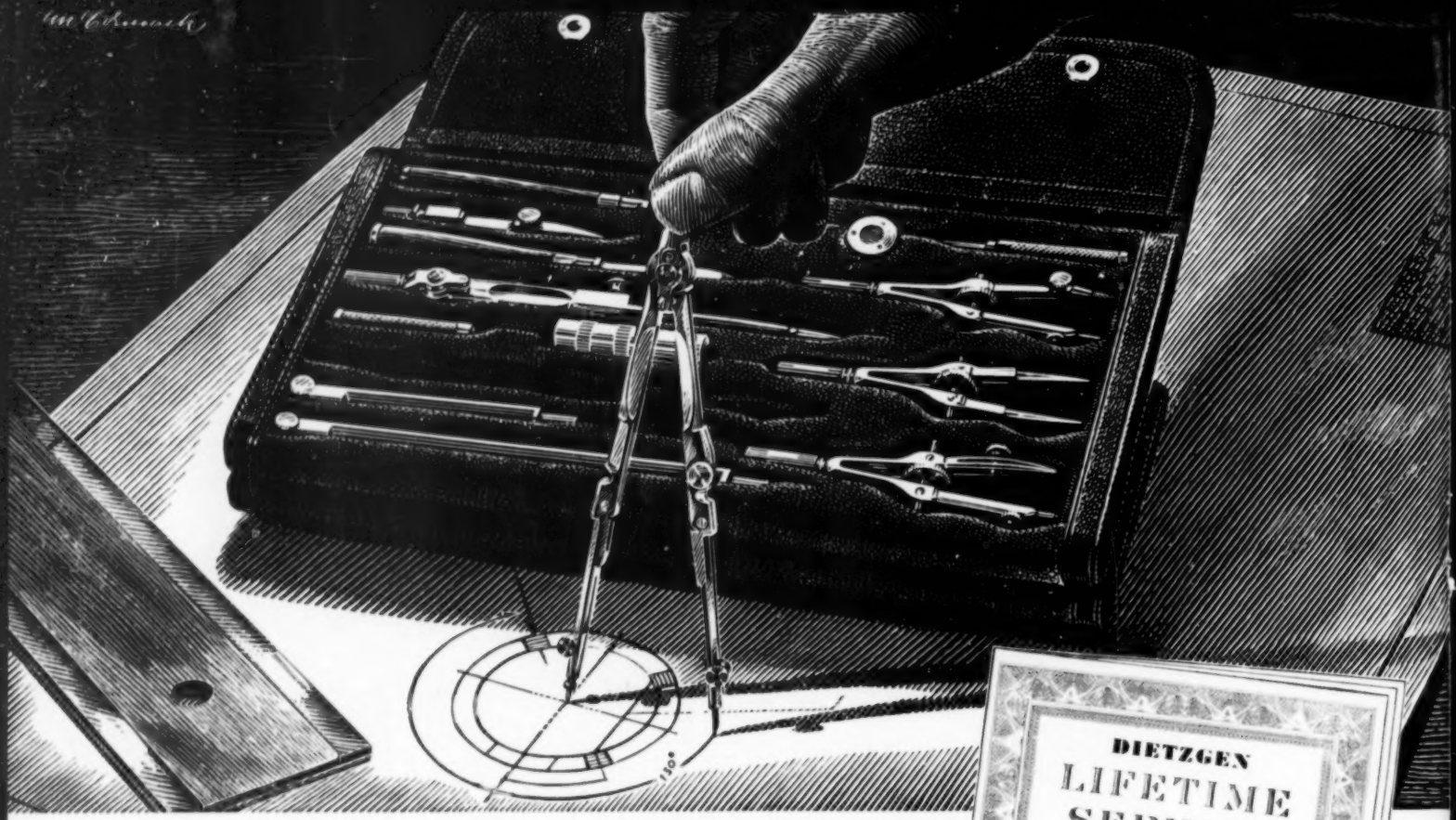
Industrial Arts and Vocational Education

The SHOP TEACHERS' PROFESSIONAL MAGAZINE

February, 1953

Vol. 42, No. 2





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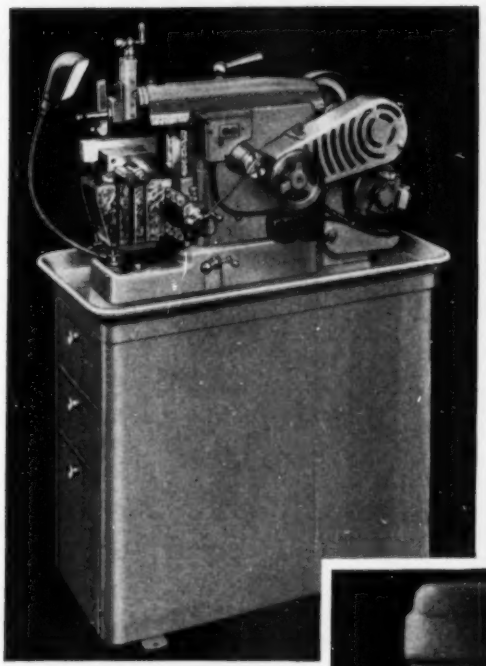

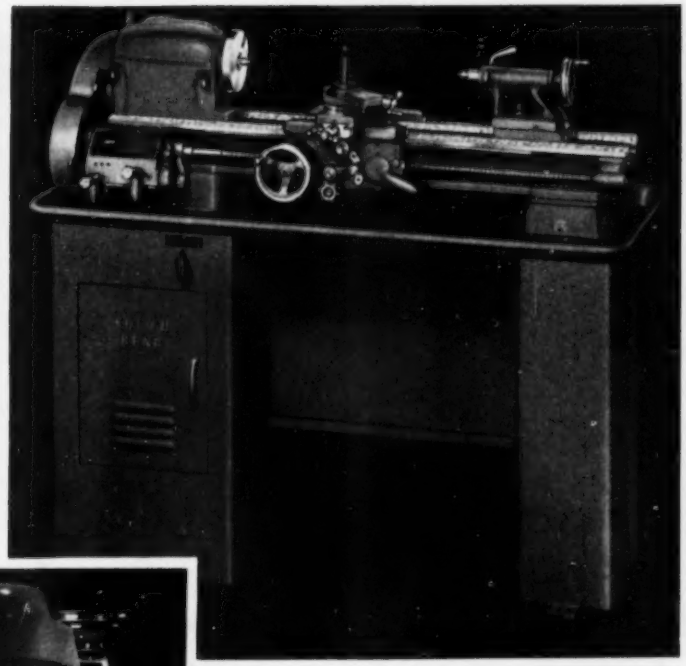

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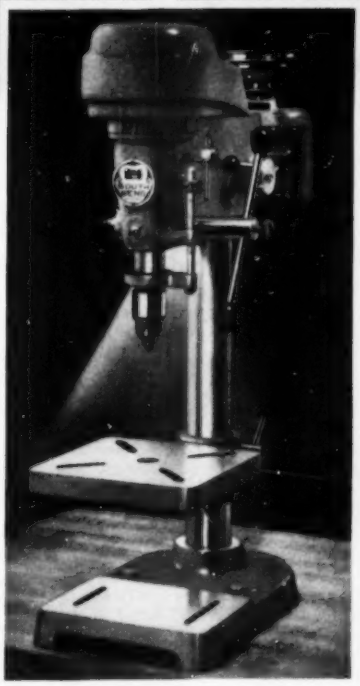

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9" Model A Underneath Motor Driven Lathe

9" x 3-1/2' Model A Lathe with 12-speed underneath motor drive; 1/2 h.p., 1 phase, 60 cycle, 115 volt motor and switch. All gears, belts and pulleys are fully enclosed.

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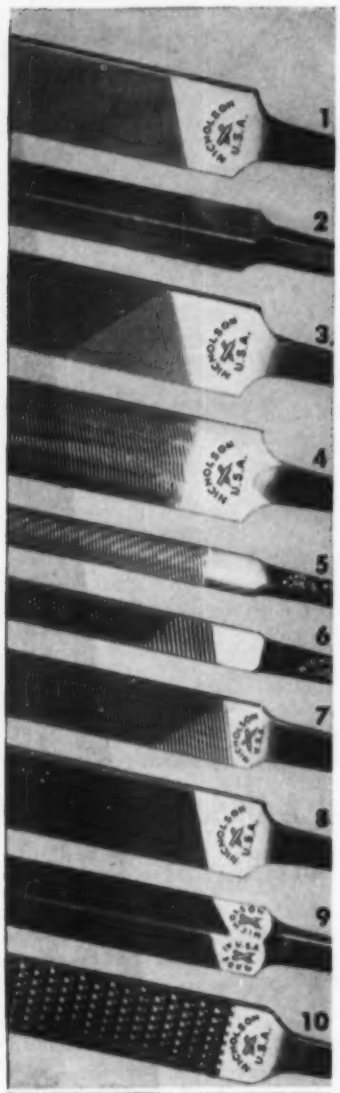

⬅ REGULAR PURPOSE FILES

(1) **MILL**—for smoothing, edge sharpening, large-tooth saw filing.

(2) **TAPER**—Regular, Slim, Extra Slim, Double Extra Slim types—for sharpening hand saws.

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(13) **CURVED TOOTH**—rigid tanged type for filing flat surfaces. Flexible type (with holder, not shown) for concave and convex surfaces as well as for larger flat areas.

(14) **LEAD FLOAT**—has coarse, short-angle "blade"-like teeth which shear or "float" away metal. For lead, copper and other soft materials.

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(17) **ALUMINUM TYPE "A"**—special serrated-tooth and "open-throat" cut, to prevent clogging. For aluminum and other ductile metals.

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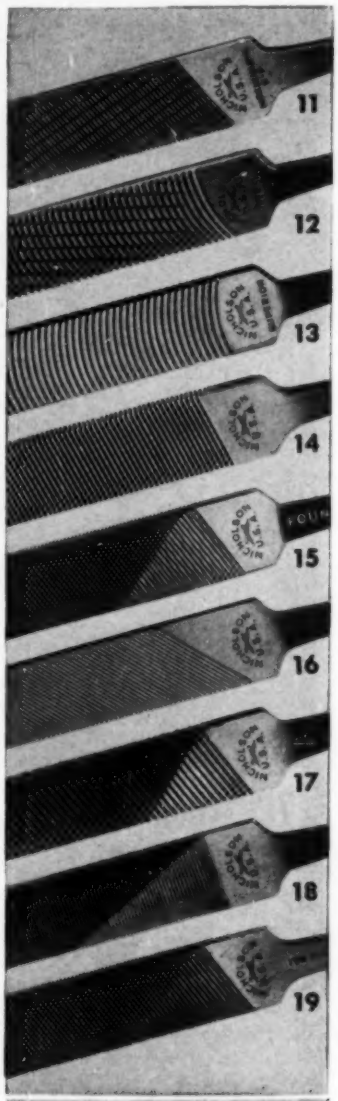

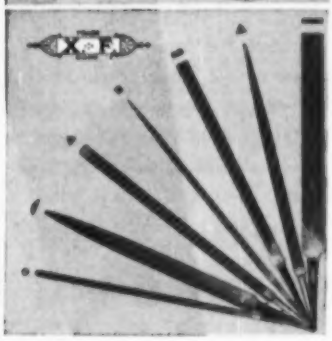

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Vol. 42 No. 2

FEBRUARY, 1953

INDUSTRIAL ARTS *and* VOCATIONAL EDUCATION

THE SHOP TEACHERS' PROFESSIONAL MAGAZINE

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This Month's Cover

The picture on the cover of the February, 1953, issue of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION shows aircraft instructor Milton Mallis explaining the functions of a General Electric E 57 Jet Engine to two of his students, Joe Hersey and David Reading.

The photograph was taken by Bud Vaughn of the advanced class in photography at the Tucson Senior High School, Tucson, Ariz.

Harry A. Goldstein, instructor of photography at the high school, submitted the photograph.

☆ ☆ ☆

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Wise choice for any school

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quality **TOOLS**
DEPENDABLE
LONG-LIVED
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Provide your students with the same fine tools that are the choice of professional wood craftsmen and you will both benefit. They will learn faster, and turn out better work. You will find Disston tools serve years longer, need fewer replacements—thus offer you a considerable saving.

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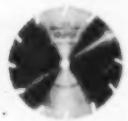

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ASSOCIATION NEWS

COMING CONVENTIONS

Mar. 19–21. Florida Industrial Arts Association, at Fort Homer Hesterly Armory, Tampa, Fla. Secretary: Robert Holmes, 608 Azeele St., Tampa, Fla.

Mar. 20–21. California Industrial Education Association, at Santa Barbara, Calif. Secretary: Lee D. Bodkin, 131 Education Building, UCLA, Los Angeles, Calif.

Mar. 24–27. Southeastern Arts Association, at Mountain View Hotel, Gattinburg, Tenn. Secretary: Flo Bottari, 503 S. Blvd., Tampa 6, Fla.

Mar. 27. Tennessee Vocational Association, at Nashville, Tenn. Secretary: W. A. Seeley, State Department of Education, Nashville, Tenn.

THE 1952 AVA CONVENTION IN BOSTON

The 3000 or more members who attended the 46th Annual Vocational Education Convention at Boston, Mass., November 30 to December 5, 1952, undoubtedly will all subscribe to the statements, Boston is a wonderful place to hold a convention, and the 1952 annual meeting was a real success.

The weather was fine, the attendance was excellent, the program was up to the best standards set by the conventions of the past, the educational exhibits were outstanding both in excellence and in numbers, and the 70 odd commercial exhibitors put on the usual splendid and helpful show of their aids to vocational education.

Harry C. Schmid, president, American Vocational Association, presided over the first general session of the convention on Tuesday, December 2, at 7:30 p.m.

At this meeting Dr. Franklin J. Keller, principal, Metropolitan Vocational High School, New York City, again reminded teachers of industrial arts and vocational education that they must teach their students to learn by doing, that they must maintain a sympathetic atmosphere in their dealings with students; that they must teach them to produce beautifully; and that they must always strive to do better.

(Continued on page 6A)

THE SHIP PAYS TRIBUTE TO

Emanuel E. Ericson

EMANUEL E. ERICSON, California's adopted son, and native of Sweden, pioneer in industrial arts education, craftsman, author, editor, teacher of teachers, and kind friend of all American youth: we of THE SHIP salute you.

From your first educational assignment in Oklahoma forty years ago, your unstinted devotion and constant service to industrial arts, to vocational education, and to education in general has been an inspiration.

Through your professional writings, through your teaching, and through your understanding personal counsel you have aided innumerable hundreds of teachers that they too might strive to serve education according to your ideal.

EMANUEL E. ERICSON, Professor of Industrial Arts and Assistant Director of University Extension, Santa Barbara College, University of California, we of THE SHIP are pleased and honored by this opportunity to recognize publicly your distinguished service to education.

Given under our hand and seal this Fifth Day of December, One Thousand Nine Hundred and Fifty-Two, A.D., at the Forty-Sixth Annual Convention of the American Vocational Association in Boston, Massachusetts.

THE SHIP

A social organization of representatives of firms in the field of vocational education.

Clyde C. Slack, CAPTAIN
Harry E. Masters, DECK OFFICER
M. D. Mobley, PURSER

Kenyon S. Fletcher
T. Todd Jones
W. C. Stuckey
Paul Van Winkle
Harry W. Sears
Charles A. Roper, COMMITTEE ON RECOGNITION OF VALIANT SERVICE

Emanuel E. Ericson, Professor of Industrial Arts, and Assistant Director of University Extension, Santa Barbara College, University of California, receives Ship's citation

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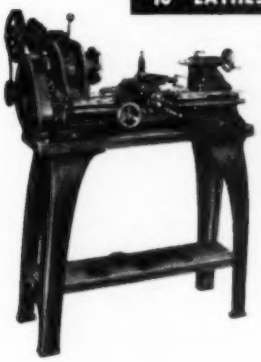
Whatever you look for in buying new tools—price, extra-value features, design that simplifies learning for your students, or engineering and construction that assure long, accurate operation with minimum maintenance—you will find what you want in the Atlas metal working line.

Compare capacities and prices—see how much Atlas helps you stretch your budget dollars. If space is at a premium in your department, note how you can get more pupil stations with inexpensive Atlas tools instead of using your funds for unnecessarily large space-wasting machines.

The rugged construction of Atlas and Atlas-Clausing tools, the bearings, the provisions for wear take-up—are bound to win commendation from those who expect you to buy tools that will stand up for years and years. If you need new equipment this term see your Atlas dealer—and send for the free wall charts mentioned below.

10" LATHES



The only low-cost lathes with Timken tapered roller bearings. 16 spindle speeds; power cross and longitudinal feeds standard equipment. Greatest value by far for school shops.

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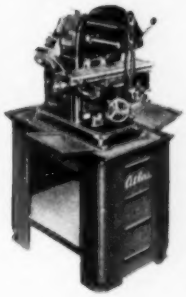
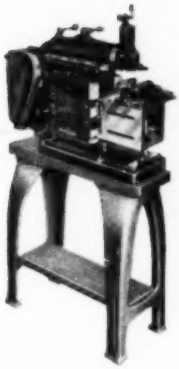


You can instruct in *all* milling operations with Atlas millers. Timken bearings, 8 spindle speeds—62 to 2870 rpm. Back-geared power. V-belt drive. Only low-cost miller available

7" SHAPERS



The only compact shapers with *all* the sturdy construction and operating features of large shapers, built down to size. Timken tapered roller bearings. Crank type ram drive. 3 speeds, 5 automatic cross feeds.

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ASSOCIATION NEWS

(Continued from page 4A)

Maurice J. Tobin, U. S. Secretary of Labor, admonished vocational educators that they should do their utmost to prepare a reservoir of skilled labor that could go into the shops if further preparation for the defense of our country should become necessary.

President-Elect Eisenhower, in a letter to the American Vocational Association, said:

"The wealth of the world is created by the work of skilled hands on raw materials. Our magnificent system of vocational education is constantly developing increased understanding of raw materials and is helping develop the skilled hands and the clear minds essential in turning those raw materials into useful wealth."

The main speakers at the second general session, held at 7:30 p.m., on Wednesday, were Dr. Earl J. McGrath, U. S. Commissioner of Education, and Roger M. Kyes, vice-president, General Motors Corp.

Dr. McGrath pointed out that America must not only furnish financial assistance to those foreign nations now receiving aid from us, but that we must also assist them by our educational programs to gain the knowledge and skills necessary for them to improve their conditions without our further help.

Roger M. Kyes reminded the teachers that they must inspire their students to persevere once they have started a project. He also stated that vocational education must be more than training for an occupation, that it must really be education for living.

Industrial Arts Education

James Hammond, director of industrial arts, State Teachers College, Fitchburg, Mass., was the program chairman of this section.

The Tuesday morning session was devoted to the subject of teaching aids, shop kinks, and shop layouts.

Ivan Hostetler, head, industrial arts education department, University of North Carolina, Raleigh, N. C., was the chairman.

Russell G. Louis, Virginia Polytechnic Institute, discussed student-made teaching aids.

Donald Maley, associate professor of industrial education, University of Maryland, College Park, Md., spoke on "How to Use Teaching Aids."

Merrill C. Hamburg presented Ira C. Madden's paper, who was absent because of ill health. His subject was "Tested Teaching Aids." It was illustrated by means of slides.

Arthur F. Ahr, New York state supervisor of industrial arts, presented an excellent dissertation on shop layouts which he illustrated with Kodachrome slides.

Fred C. Finsterbach, director of education, Walker-Turner Co., showed how to lay out shops by means of three dimensional models.

John Claude, Delta Division, Rockwell Mfg. Co., presented some of the prize-winning plans of the Delta Contest.

Roy A. Radtke, supervisor of industrial arts, Milwaukee, Wis., summarized this very instructive series of talks.

A demonstration in plastics by Frank Onischuk, instructor, Saxon Trade High School, Leominster, Mass., followed.

The chairman of the Tuesday afternoon session of the National Association of Industrial Teacher Educators was Elroy W. Bollinger, professor, State Bureau of Vocational Curriculum Develop-

(Continued on page 8A)

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ASSOCIATION NEWS

(Continued from page 6A)

ment and Industrial Teacher Training, New York City.

Ethel Darling, of the New York State Bureau of Vocational Curriculum Development and Industrial Teacher Training; and Jim Fisher, New York Vocational High School, New York City, gave excellent performances to show the power of dramatic teaching.

Projected aids, tape recording, motion picture dramatization, and sound-film techniques were also presented.

Curriculum principles were discussed at the Wednesday morning meeting, the chairman of which was G. Wesley Ketcham, state supervisor of industrial arts, Hartford, Conn.

The symposium consisted of John F. Friese, professor of industrial-arts education, Pennsylvania State College, State College, Pa.; R. Lee Hornbake, professor of industrial education, University of Maryland, College Park, Md.; William J. Micheels, professor of industrial education, University of Minnesota, Minneapolis, Minn.; and William H. Burton, professor of education, and director of apprentices, Harvard University, Cambridge, Mass.

G. Harold Silvius, head, department of industrial education, Wayne University, Detroit, Mich., summarized the talks given.

A demonstration on pottery by John Butler of the Butler Craftsmen, Ossipee, N. H., followed.

At the Wednesday afternoon meeting of the National Association of Industrial Teacher Educators the question, "Can Trade and Industrial Instructional Materials be Developed Co-operatively on a National Basis," was discussed.

Arthur B. Wrigley, state supervisor of trade and industrial education, Trenton, N. J., acted as moderator.

John A. McCarthy, state director of vocational education, Trenton, N. J., presented the "History of Co-operative Materials Development Program."

Two panels then discussed the pros and cons of the main question for which this session was held. As in previous years no definite solution was arrived at.

On Thursday morning there were demonstrations and displays of various kinds. There also were individual committee meetings, and the afternoon was left open so that the industrial-arts members could visit the commercial exhibits.

Friday morning the problems of industrial arts in schools and colleges were discussed at a meeting at which Hoyt H. London, University of Missouri, Columbia, Mo., was chairman.

The panel that discussed this problem consisted of Verne C. Fryklund, The Stout Institute, Menomonie, Wis.; John R. Ludington,, U. S. Office of Education, Washington, D. C.; Lynne C. Monroe, Santa Barbara College, Santa Barbara, Calif.; James F. Baker, Boston University, School of Education, Boston, Mass.; and A. Russell Mack, Boston, Mass.

Armand Rehn, Newark, N. J., summarized the meeting.

Friday morning's meeting was devoted to a discussion on "Contests Open to Industrial Arts Students."

J. Ely Van Hart was the chairman, and the speakers were E. B. Cotton, Propeller Club of the U. S.; William King, All-American Soap Box Derby, General Motors; Dewey Barich, Industrial Arts Awards, Ford Motor Co.; C. W. McClellan, Fisher Body Craftsman's Guild, General Motors; and Warren E. Bartlett, International Model Plane Contest, Plymouth Motor Corp.

Francis J. Emery, director of industrial arts, Boston, Mass., summarized the talks.

Sectional meetings were also held by the agricultural, business, distributive, home economics, and trade and industrial, vocational guidance, and rehabilitation divisions.

At the banquet on Thursday evening a capacity crowd had an excellent dinner and a fine program. The invocation was given by Rt. Rev. Msgr. Cornelius T. H. Sherlock, superintendent, Diocesan Schools, Archdiocese of Boston.

M. Norcross Stratton, state director of vocational education, Commonwealth of Massachusetts, was chairman, and the main address was given by Arch N. Booth, executive vice-president, Chamber of Commerce of the United States, Washington, D. C.

The House of Delegates met on Friday morning.

The officers elected for 1953 are:

President, Martha Creighton, professor of home economics education at Virginia Polytechnic Institute, Blacksburg, Va.

Vice-president for home-economics education to fill Miss Creighton's unexpired term, Margaret Browder, Tennessee State Supervisor of Home Economics Education.

Vice-president for trade and industrial education, Robert Reese, Ohio State Supervisor of Trade and Industrial Education.

Treasurer, Charles W. Sylvester, assistant superintendent of schools in charge of vocational edu-

(Continued on page 22A)

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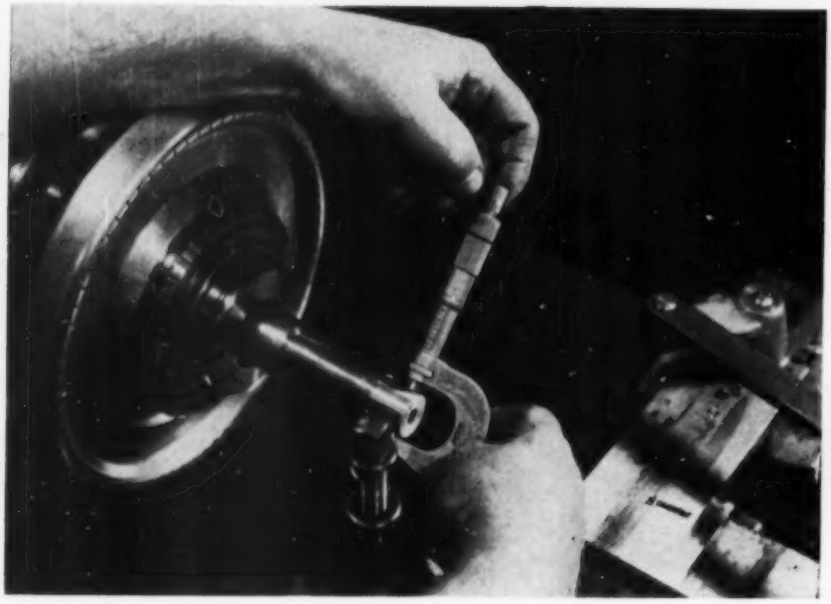

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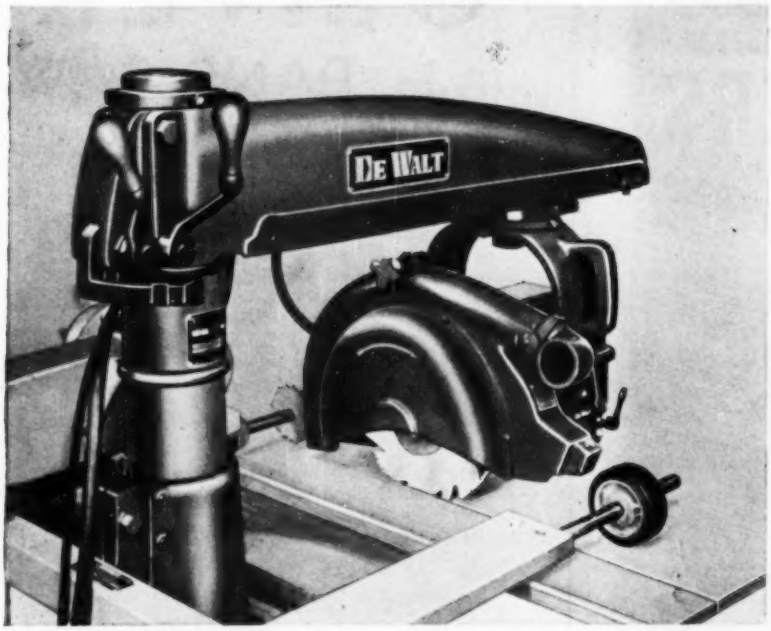

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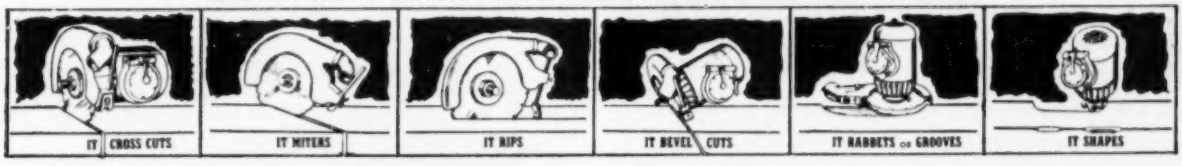

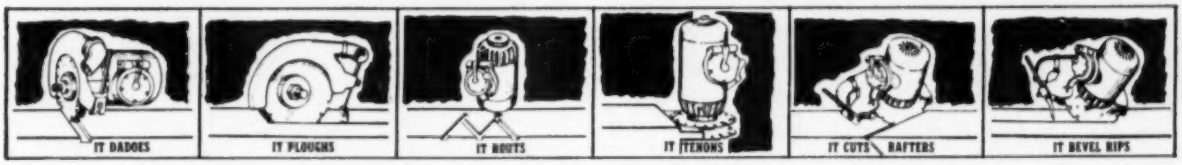

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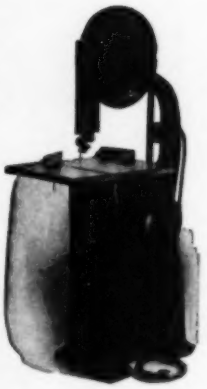

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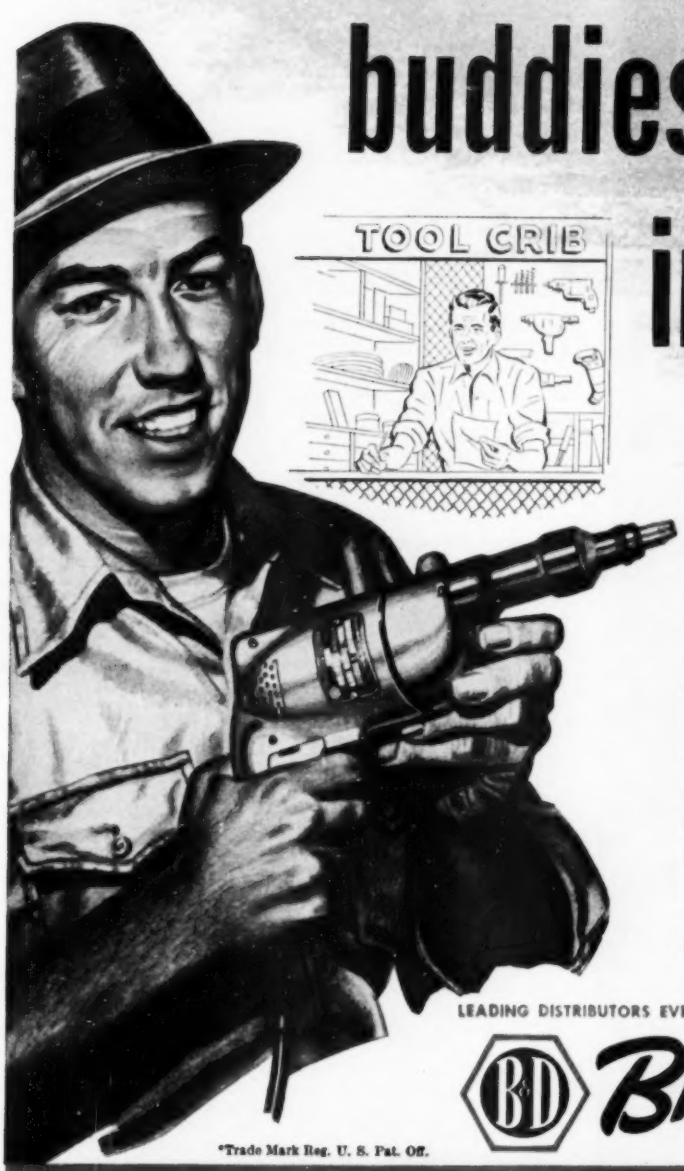

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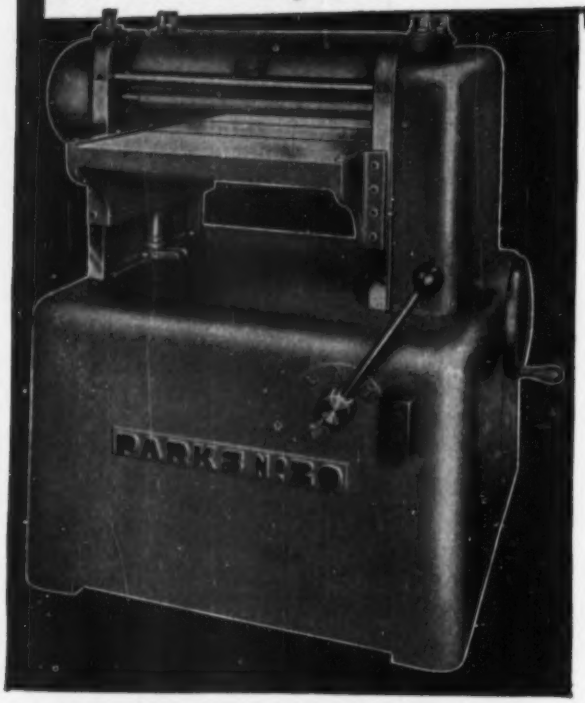

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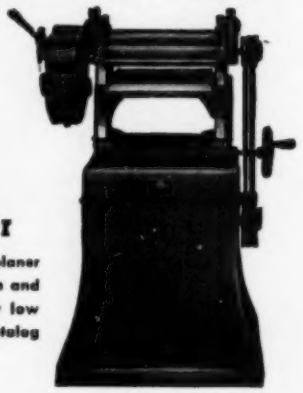

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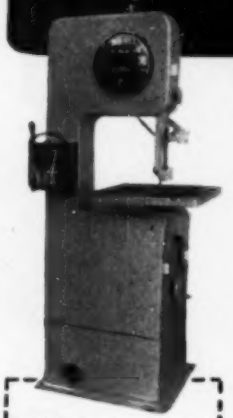

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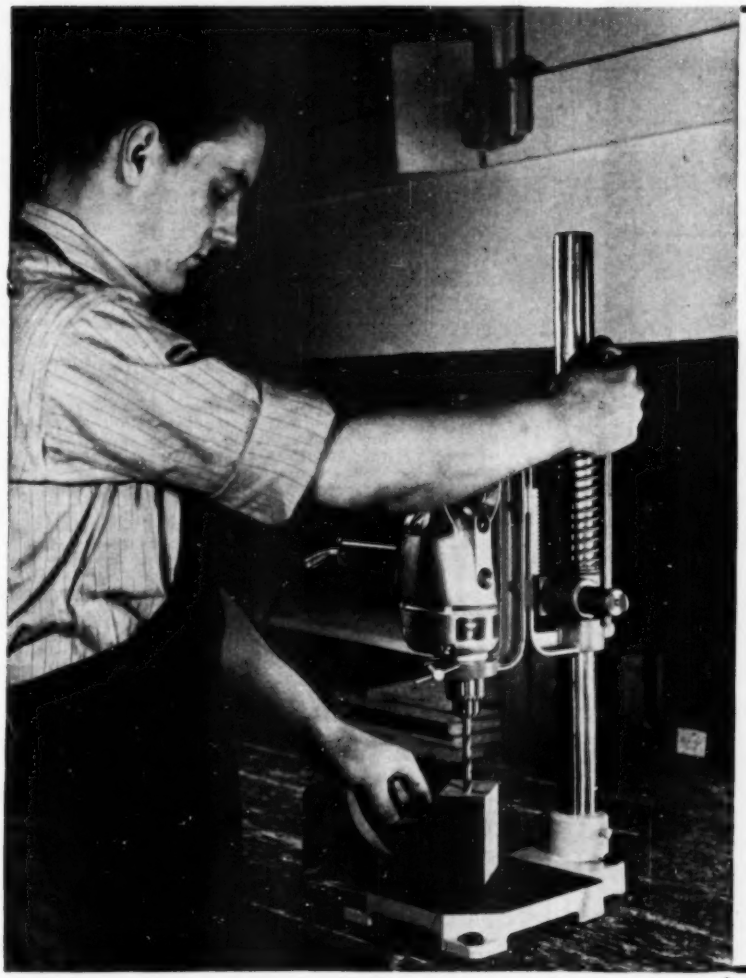

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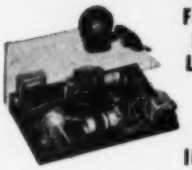

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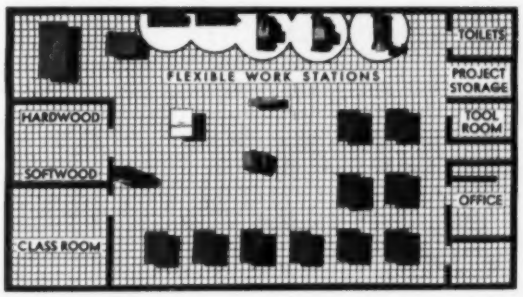

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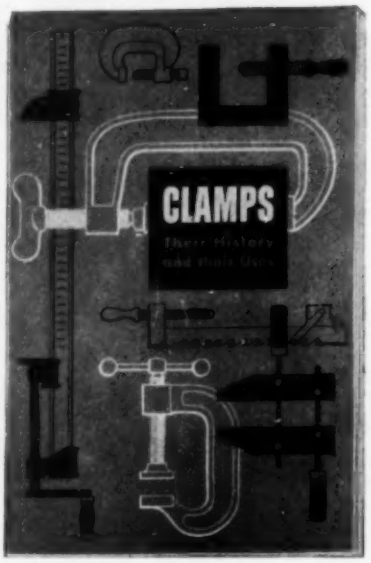

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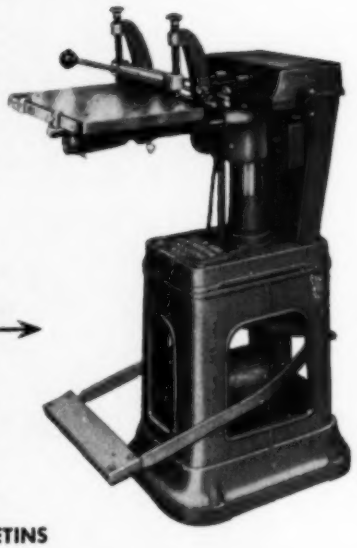

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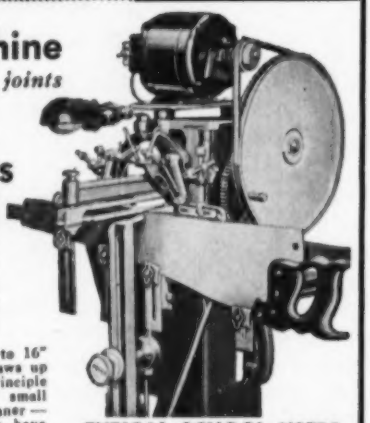

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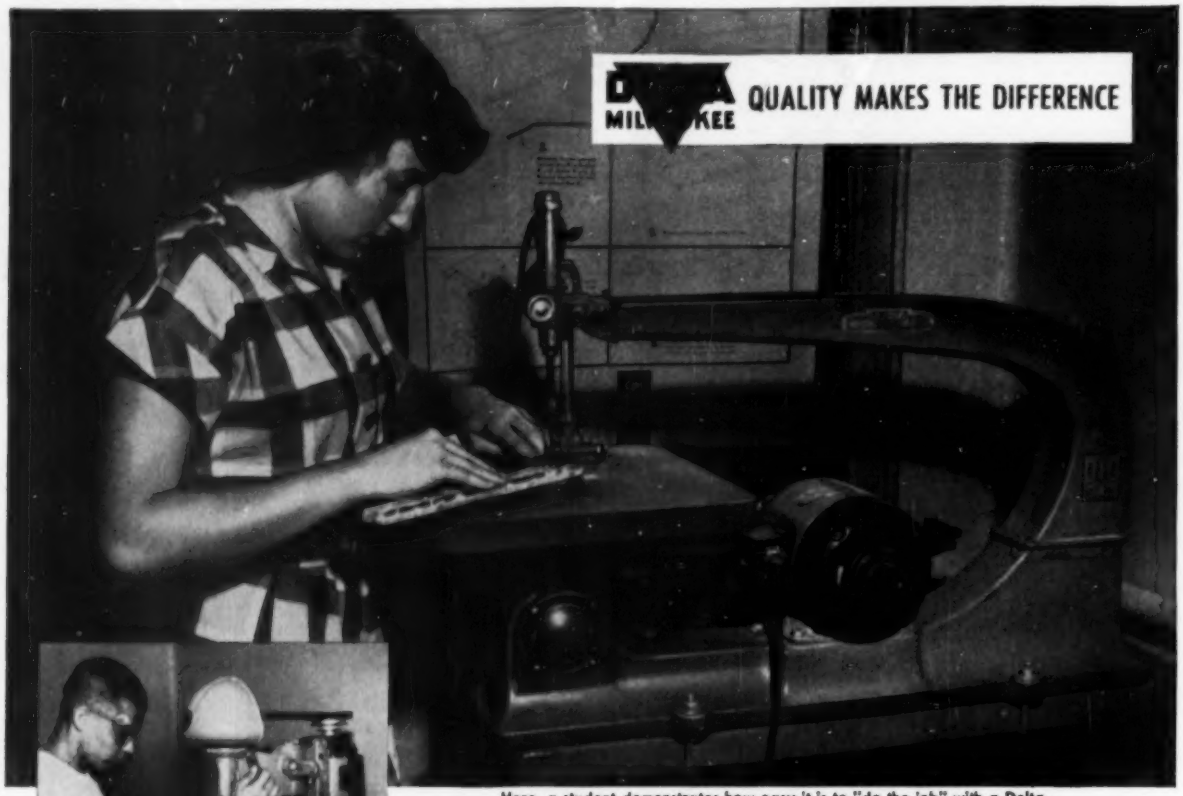

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INDUSTRIAL ARTS *and* VOCATIONAL EDUCATION

FEBRUARY 1953

Teaching for Leisure In Adulthood and Old Age

GOLDEN ROMNEY
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The State College of Washington
Pullman, Wash.

Those colleges which are preparing teachers in the field of industrial-arts education have one of the most challenging and definite responsibilities in the field of education today. America's population is rapidly becoming a country with a large percentage of oldsters, many of whom will be confronted with a serious problem of adjustment upon retirement. There is great need for educating them in "How to Become Happy and Successful in Retirement." This happiness is going to depend pretty much upon the skills and interests the individual has developed in his process of maturation. If he has not acquired these interests prior to old age, it is difficult and almost impossible in some instances, to develop such skills at so late a period.

Our Aging Population

Let us look at this changing population in America. It is estimated that by 1980, two fifths of our population will have passed the age of 45, and one seventh will be over the 65 year mark. Associated with this problem of greatly increased numbers in the older brackets, we are retiring our people at a much younger age. Sixty-five years for retirement has been an average. Some companies are retiring their employees at 60 and some organizations are advocating 50 and 55 years as a possible retirement age. There is little doubt, that with the pressure from youth for the positions held by the older group, plans for much earlier forced retirement will evolve. This means added leisure time which presents an added problem in the field of social adjustment.

Education, in all of its phases, is being faced with the need for expansion of its education in the field of leisure. It, by no means, has solved this problem and as a result, we find much maladjustment among all ages. With few exceptions, most communities and schools have done little with this problem of the oldsters. It is one of the difficult problems to solve. It can and should be approached from two angles: first, that of changing our philosophy that leisure is a disgrace and second, that of providing an education for leisure which will include the development of skills in various areas of hobbies and crafts, as well as development of an interest in a wide variety of recreational activities.

Whose Responsibility?

It is the responsibility of all personnel in our educational systems to cope with the first, that of conditioning people to believe in *learned* leisure and its opportunities. We must move more to the Chinese ideal "that it is through leisure in old age that we develop a feeling of contentment." Lin Yutang, in speaking of this Chinese concept says, " . . . then in the sunset of our life, the endocrine glands decrease their activity, and if we have a true philosophy of old age and have ordered our life pattern according to it, it is for us the age of peace and security and leisure and contentment."

Many of us have seen examples of this contentment in our own society. It has come about through development of so many outside interests that when leisure comes, there is no time for a feeling of futility and frustration. This is one of the most important antidotes to this mental problem which abounds in our civilization today.

That brings us to the second part of the problem, the opportunity for the development of skills and interests which will have a very strong carry-over into adulthood and on into the sunset of life. This can be done, and should be done, as part of the school curriculum. Too much attention has been given to the teaching of Greek or Latin and not enough to the problems of living in our American society. It may not be considered "academic" to teach skills in the various crafts, but it will have a much greater utilitarian purpose than will that of some dead language. We need to review our school curriculum and evaluate them upon present-day standards and objectives. To retain certain subjects because they are traditional and have been handed down through our school systems for a few hundred years, even though they contribute little to the enrichment and betterment of our lives, is futile and should be eliminated. Let the first things come first. Let us teach to make our people more useful and happy citizens at all ages.

The Field of Arts and Crafts

In the experiments which have been carried on with the old age group, it has been found that the field of arts and crafts has been tremendously valuable as a therapeutic agent in adjusting the lives of those who are forced out of our industrial society and are no longer considered capable of work. Even among those who were embittered toward society because of forced retirement, new hopes and aspirations have arisen through new hobbies.

The industrial-arts curriculum should be rich in offerings for its prospective teachers in the areas of crafts and other skill subjects, which have real value in the public school systems of our country, and which could well be taught as part of the curriculum as well as offering them as part of the extracurricular program.

There is real danger in making them, as is now so often done, just a part of the after school or club program, as those who miss this program are very often the ones who will make the poorest adjustment in adult life. People who stay young, despite their years, do so because of an active interest that provides satisfying experiences which comes through participation. One will usually find the elderly person who has hobbies and interests, a very well-adjusted and happy person.

Satisfying experiences is the desire of every human being and with the great increase in leisure in America, our educational systems should point to *preparation for living in this modern age*. One only has to experience the great satisfaction which comes from *carving* in leather, or *using the potter's wheel*, or perhaps in *making a copper bowl*, or as Dr. George Cutten, formerly president of Colgate University, *pounding silver bars into silverware*, to know that the completion of the project, not its monetary value, is the thing that is pertinent, but rather the deep satisfactions that come from the *doing*, the *creating*. This is the satisfaction that every school child, and every adult in America should have. This is the phase of the program that so many of our colleges have neglected. This should be the responsibility as well as the opportunity for the industrial-arts departments to really contribute to the education of the youth of our land.

To aid in this education then, every industrial-arts college preparing teachers, should give courses to the end, and with the objective of not only developing skills in its future teachers in the fields of hobbies and crafts, but imbue them with the opportunities, as well as the responsibility, of carrying this message to their students through a splendid program in the elementary and high schools of this country. In so doing, they would be helping to solve one of the most perplexing problems that confronts the nation today, *education for leisure in adulthood and old age*.

Shopwork in Industrial-Arts Teacher Education

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Associate Professor of Education
The Stout Institute
Menomonie, Wis.

The *shop* and *drawing* course work in the industrial-arts teacher education curriculum is indeed worthy of consideration. As previously presented on pages 329–331 of the December, 1952 issue of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION this should represent one third of the total graduation requirements as revealed in the study completed by the writer.[1] However, there are several other valuable aspects of this shopwork other than simply how much of it should be required. It is the intent of this article to present some of the reactions given by the 492 industrial-teacher educators who co-operated in the study, together with the practice reported for 109 institutions.

For purposes of this report the term *shop* will be used to include not only that which may be ordinarily conceived as such, but also drawing and laboratory or technical work as it may variously be termed.

Of first consequence is that aspect which considers when the potential industrial-arts teacher should begin taking shop courses and its corollary — how should it be distributed throughout the period of preparation. There can be little doubt that shopwork should begin in the first year the potential industrial-arts teacher is enrolled.

That shopwork should begin in the first year is almost unanimous in both practice and in belief, for 97.19 per cent of the institutions reporting begin shop training in the first year. Although one institution (0.93 per cent) reported it as being confined to the fourth year, none of the teacher educators believe it should be delayed that long. As a group, the industrial-teacher educators indicated that it should commence early, for 94.38 per cent would begin shopwork in the first year; 4.98 per cent would wait until the second year; and only 0.62 per cent would delay it to the third year in the curriculum schedule pattern. The self-contained *jury* of 60 possessing the doctor's degree, in-

[1] Gustave S. Wall, "Dual-Purpose Industrial Education at the College Level," Ph.D. Thesis, University of Minnesota, 1951, 263 pp.

cluded in the whole group of industrial-teacher educators, is unanimous in its opinion that it should begin in the first year.

These reactions and the practice reported are shown in Table I.

TABLE I. Year in Which Shop Training Should Begin in Industrial-Arts Teacher Education

Year	*Group Opinion*	*Practice*	*Jury Opinion*
1	94.38%	97.19%	100.00%
2	4.98%	1.87%	0.00%
3	0.62%	0.00%	0.00%
4	0.00%	0.93%	0.00%

The question of how shop courses should be spread throughout the four-year period revealed that three-fourths of the institutions practice, and the same portion of the respondents believe, that it should be distributed somewhat evenly throughout the four years. As the only other alternative on the check sheet sent to the respondents was expressed as *concentrated, though not exclusively, within the first two years,* the remaining quarter of the tabulated returns are found favoring it. However, written comments by some of the respondents as well as variations presented in practice may justify some other pattern than the two presented above. These varied from concentrating such work largely in the first three years to a plan in which the shop course work would taper downward in quantity each year. In any event it is easy to conclude that shop preparation should be found in the potential industrial-arts teacher's schedule in each of the four years of his training.

As it is commonly conceived, industrial arts is an area encompassing many shop fields, hence, the industrial-arts teacher must be prepared to teach a number of shops. The fact that he should take a total of approximately forty semester credits — one third of the total recommended by the teacher educators — causes one to wonder, into how many different shops this should be spread? Should the teacher be well prepared in one or two, or should he have just a little training in each of the many?

The group as a whole indicated that the potential teacher should specialize in at least one of the usual industrial-arts areas. This was affirmed by more than 85 per cent of the group. The *jury* was slightly more nearly unanimous for almost 92 per cent of it expressed the belief favoring specialization in one area.

In practice, of those reporting on this item, 49 institutions permit and 31 require such specialization. It may be assumed that the remainder of the institutions (29), for which supplementary sheets were completed by the department heads, have no statement of policy in regard to this matter. It is conceivable that some may actually forbid it, though this was not brought out in the responses received.

However, specialization is a matter of amount as well as quality of instruction given. On the assumption that the quality exists the search was confined to what would be considered as the desirable minimum number of shop credits necessary for specialization. It will be noted in Table II that almost 80 per cent of the respondents favor an amount ranging from 11 to 15 credits or more, and that in those institutions (91) reporting on this item almost three fourths fall within the same range. The facts as to opinion and practice are presented in Table II. It will be noted that none of the respondents is in favor of *no limit* although almost one tenth of the institutions have that policy.

TABLE II. Minimum Number of Semester Credits Desirable for Specialization in a Shop Area

Number of credits	*Group Opinion*	*Practice*	*Jury Opinion*
1–10	20.57%	27.47%	24.06%
11–15	52.08%	34.06%	57.40%
16–20	19.79%	13.18%	11.11%
21–up	7.55%	16.48%	7.40%
No limit	0.00%	8.79%	0.00%

Attention is called to the fact that more than one fourth of the teacher educators are of the opinion that specialization would best be attained by permitting at least 16 semester credits in the area. At the present time that amount is permitted or required by over one third of the institutions practicing such specialization.

The circumstances under which credit for the necessary shop courses may be earned or transferred vary considerably throughout the institutions. While no precise tabulation is available it may be reported that the industrial-arts teacher education institutions accept for transfer shop training earned for other than teacher training. This includes work taken as engineering, vocational-industrial or technical training. World War II "GI" service training is also accepted by some.

It may be reasonably assumed from the comments made that only work of a collegiate grade is generally accepted for credit transfer. Varied means of evaluation are used before such transfer is made in about one fourth of the institutions. Some institutions permit transfer only to offset electives, others substitute it for required shop courses, while some record it and permit the student to take other courses to acquire the requisite total. At least five of the institutions reported that they utilize engineering shops for their shop training.

The opinion expressed by the group in regard to whether post high-school engineering, vocational-industrial, or technical training would serve the industrial-arts teacher student revealed that such training has worth. Almost three fourths of the teacher educators affirmed its worth, only about 10 per cent indicating they thought it of no value, the remainder being uncertain. If the uncertain respondents are disregarded the affirming group amounts to seven eighths of the total.

It is interesting, if not significant, that only 46 of the group believe it unnecessary or undesirable to make any adjustment in a required shop course if the student has had previous work experience or has taken other courses in the same area for engineering, vocational-industrial or technical training. However, adjustment of some nature is favored by many, for 95 would permit him to enroll in an advanced course; 244 believe he should be allowed credit for it through examination; 107 would do likewise through other evaluation; and 220 expressed the belief that the course should be adjusted in some manner for such an individual. It is reasonable to conclude that the teacher educators believe some recognition should be given to students presenting either training or work experience as a background by evaluation or adjustment.

In summary and conclusion it may be expressed that the portion of the study reported here reveals that both practice and belief justify the initial contact with *shop* courses in the first year of the industrial-arts teacher education curriculum. Further, there can be little doubt that shopwork should be spread throughout each of the four years for three fourths of the responses favor this spread. That the work should be spread evenly, throughout the four years, may be questioned for the data obtained did not provide a positive answer to this aspect.

Specialization in one of the usual industrial-arts areas is affirmed by 85 per cent of the industrial-teacher educators responding. This is substantiated also by the practice reported. The minimum number of semester credits deemed desirable for satisfying the specialization is in the neighborhood of 15 for almost 80 per cent of the respondents indicated a range from 11 to more than 21 and almost the same percentage of institutions use the same range for specialization.

As to recognition of credit earned for purposes other than industrial-arts teacher preparation the group expresses the belief that such work has value. It may also be concluded that effort should be made to adjust the course and/or curriculum requirements for those students possessing shop training and work experience.

Improvement of Achievement Tests

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and
DONALD G. LUX
Ohio State University

Actual improvement of written examinations and of test questions cannot be made without some means of determining how good the test and test questions really are. It is only by weeding out those questions that are unsatisfactory that real progress may be made. Unfortunately this improvement cannot be made by asking students their opinions of the questions or rereading test questions. It is difficult to accept, but nevertheless true, that exactly why one test question may be good and another one bad cannot always be determined even after the questions are found to be excellent or poor.

To illustrate a simple procedure for the improvement of the written examination, the following study was made.[1]

A test made up of seventy questions was given to 80, ninth-grade, industrial-arts students in the Louisville public schools of Louisville, Ky. The 80 papers were corrected and were then sorted in order by total test score with the highest paper first and the lowest paper last and with the intervening papers in order. The top 40 of these 80 papers were then called the upper group, and the bottom 40 the lower group. The number of right responses to each question were then counted for the two groups and tabulated. The results of that tabulation appear in Table 1.

TABLE 1. Item Analysis for Original Test

Question Number	*Upper Group Totals*	*Lower Group Totals*	*Question Number*	*Upper Group Totals*	*Lower Group Totals*
1	39	37	36	5	2
2	31	18	37	22	8
3	36	33	38	0	0
4	12	12	39	4	2
5	38	36	40	12	8
6	23	14	41	35	15
7	16	2	42	29	23
8	29	25	43	22	10
9	40	38	44	27	17
10	25	21	45	33	27
11	20	7	46	23	11
12	20	5	47	30	11
13	27	17	48	26	24
14	26	13	49	32	27
15	11	8	50	29	22
16	25	11	51	37	26
17	27	9	52	38	34
18	16	9	53	31	24
19	19	10	54	30	13
20	21	12	55	37	33
21	29	26	56	40	34
22	23	20	57	40	28
23	27	21	58	37	36
24	37	38	59	34	27
25	35	21	60	20	15
26	30	25	61	35	30
27	35	31	62	37	28
28	30	14	63	16	16
29	35	13	64	27	12
30	33	30	65	29	9
31	37	13	66	18	13
32	23	5	67	8	9
33	23	9	68	30	22
34	33	11	69	15	7
35	25	6	70	23	10

Referring to this table, we find for question No. 1 that 39 of the upper 40 and 37 of the lower 40 responded correctly to this item. An inspection of this table indicates that questions 1, 3, 4, 5, 9, 15, 21, 22, 24, 30, 38, 39, 48, 58, 63, and 67 are of little merit since both halves seem to reply correctly to these questions in about the same number. As a matter of fact, question number 67, for example, is answered right more often by the lower half of the class. This question is then working against our total test and the others make little contribution to the ranking of students in order of achievement.

From the test results given in Table 1, the reliability of the test was determined by the analysis of variance technique[2] and the results are shown in Table 2.

TABLE 2. Test Reliability Computed by Analysis of Variance

Source of Variance	*df*	*Sum of Squares*	*Mean Square*
Between Individuals	79	92.4	1.17 (a)
Between Items	69	296.7	4.30
Residual	5451	992.5	.1821 (c)
Total	5599	1381.6	

$$\text{Test reliability} = \frac{a - c}{a} = \frac{1.17 - .1821}{1.17} = .84$$

After the computation of the test reliability, the test was rewritten with questions 1, 3, 4, 5, 9, 15, 21, 22, 24, 30, 38, 39, 48, 58, 63, and 67 being revised or replaced. This rewritten test was then

Ceramic masks made in the art department of the Manhattan Junior High School, Manhattan, Kans. Mr. Peter Perdaris, instructor.
— Photo by D. C. Marshall, director of audio-visual aids

[1]Donald G. Lux, "Construction and Improvement of an Achievement Test in Ninth Grade General Metalwork," Unpublished Plan B Paper, The Stout Institute, 1952.

[2]Cyril J. Hoyt, "Test Reliability Estimated by Analysis of Variance," *Psychometriks*, VI (June, 1941).

given to an equal group of students and the reliability for the revised test computed by the analysis of variance technique. The results of this computation are included in Table 3.

TABLE 3. Rewritten Test Reliability Computed by the Analysis of Variance Technique

Source of Variance	*df*	*Sum of Squares*	*Mean Square*
Between Individuals	76	149.3	1.96 (a)
Between Items	69	241.2	3.50
Residual	5244	933.1	.1779 (c)
Total	5389	1323.6	

Test reliability = $\frac{a - c}{a} = \frac{1.96 - .1779}{1.96} = .91$

Table 2 indicates a reliability coefficient of .84 for the first administration of this 70-question test. Table 3 indicates a reliability of .91 for the rewritten test, a marked improvement.

This 70-question test was thus improved in at least one respect, test reliability, by elimination of the unsatisfactory test questions by the simplest possible item analysis.

The steps in this item analysis may be summarized as follows:

1. Score all papers.
2. Arrange papers in order by total test score.
3. Divide papers into two halves.
4. Label highest scoring half, upper group.
5. Label lowest scoring half, lower group.
6. Count right responses for each question for each half.
7. Compare upper half right responses with lower half right responses.
8. Revise or eliminate questions that lower half answer correctly more often, or as often, or almost as often.

Effective Techniques for Counseling High School Students

STEVE GALE
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Counseling is based upon a thorough study of the individual. Every phase of a student's life must be taken into account. The student's environmental, his sociological, psychological, and physiological developments are important factors in assembling data for the cumulative record that is essentially a part of the guidance program.

A cumulative record of every student should be kept throughout his years in the elementary school. This record will contain invaluable material for the counselor. The information as to the social status of the family, their occupation, religion, etc., will be at hand for use of the high school counselor, saving his time as well as the students. The counselor will have a basis for his plans for each and every student.

For students whose records are incomplete, the counselor must use the sources that are at hand in making up a record. He may obtain information from the following sources: the school nurse, doctor's reports, teachers' periodic personality estimates, interviews of the home-room teacher, letters to the parents, inquiries to outside social agencies. It is often desirable to have personal interviews with the student's parents. The counselor is responsible for arranging and conducting these interviews. He must be able to meet and talk with the parents in such a manner that both parties will feel free to discuss the problem at hand.

The necessary tests that will add to the student's file must be recorded accurately. These tests may be of various kinds: aptitude tests, I.Q. tests, personality and interest tests, etc., and they must be administered by competent people, usually the teachers. It is a waste of time for the counselor to give tests, but he must be prepared to work in any phase of the testing program whenever called upon.

When all available information about a student has been collected it will aid the student and the counselor to solve the student's problems. The counselor should not solve the problems for the student, but should aid him in solving his own problems.

The record should include all the materials mentioned, as well as observations of the student in action, and samples of his work. It gives a total impression of the student's past. This information should be filed in a folder for each student. It is suggested that a file folder itself should serve as a personal data sheet, including such information as name, sex, race, date of birth, progress in school, etc. The files should be located so that the counselor can get material from them without waste of time.

Occupational and Avocational Interests and Problems

One of the major parts of a counselor's work involves discussions of occupations, vocational problems, and vocational schools. The counselor must have up-to-date information at hand so he may be ready to answer any questions that may arise. Several of the sources of occupational information were listed by Darley, which included a number of monthly and quarterly pamphlets and bulletins. Magazines that have information about various industries are also recommended for the counselor's use. The United States Office of Education, the Occupational Information System of the Science Research Associates, local employment offices, etc., are sources from which suitable material may be obtained.

The counselor may work with the school librarian in placing those pamphlets, magazines, etc., in the library so that they may be used by everyone. A card catalogue of all the material on hand is advisable; this enables the students to find answers to many problems for themselves. The counselor must have his own card catalogue so he can be ready to refer pupils to specific information on any one phase of occupation or industry.

Vocational interests can be detected at an early age, and this information incorporated in the student's life file. Aptitude

tests show indications of many students' interests. Williamson and Darley suggested a test for recording attitudes toward vocational choices and vocational problems, where the student indicates his interests in broad vocational fields. This information will also be invaluable to the counselor, especially for students who are planning on work immediately after high school and for those who plan on entering a vocational school.

Available Part-Time Work

Counselors might also keep a record of fields in which part time work is available to students. If a student is interested in mechanics he might well be placed in a local shop, working part time, where he can develop his skills, familiarize himself with the responsibilities of the work, etc., before he chooses his life's occupation. This enables him to "learn by doing" and if he finds the tasks involved too difficult for his mental or physical make-up he will be better qualified to choose another field of work.

Announcements of part-time jobs, occupational opportunities, lists of schools, etc., should be made to all students. Rohr and Speer suggest the use of the school newspaper for this purpose. This seems to be advisable as high school students tend to be very much interested in their school newspapers. The counselors must see that the information which is published is correctly written so that students will not be misinformed.

Knowledge About the Student

A counselor must collect and absorb as much information about the student as he possibly can before the student comes for an interview. This may be done with the use of the student's file. When the student appears for an interview the counselor will then have some idea of how to get started so as to make the student feel at ease. This is done by the counselor starting the conversation about something in which the student is interested. The interview must be held in private so that the student will feel free to discuss his experiences and problems frankly and in detail. Most students will not do this if someone else is listening in on the conversation.

The counselor should have a private office made as attractive and pleasant as possible. Even in crowded schools an inexpensive but comfortable office can be constructed at the end of a hallway or some similar place. If at all possible the counselor's office should be located near the central files so that material needed for an interview will be close by.

Counseling interviews should be scheduled, and enough time allowed for each interview so that the counselor will not have to hurry, which makes the student feel ill at ease. The counselor should seek to cultivate a desire in the student to ask when he may come in again. This can be done by such statements as, "Let me know how this turns out," or "Would you mind finding out how this ends and then let me know?"

Routine checking interviews should be infrequent. If counseling is more than advising about registration or a talk about some disciplinary problem the student will usually see how he will benefit by an interview and make an attempt to see his counselor often. To get the students started on interviews with their counselors, invitations may be extended whenever possible, in the hallways, in classrooms, posters on bulletin boards, by the school news, or any other suitable way.

It is important that the counselor record essential points of the interview. He should not take notes during the interview for fear that the student might feel that the interviewer is a reporter. Short phrases may be jotted down during the interview, then immediately after the interview the information collected can be written or dictated and put into a confidential file. This information will aid the counselor the next time the student is interviewed, thus avoiding confusion and contradictory statements.

Appointments should be made for a later interview. From interview to interview the counselor can see what the students' problems are and aid each student in solving his problems. After a few interviews with a student the counselor may suggest the kind of work for which he is best suited, whether or not he should go on to school, or what he should do before considering looking for a job, and so on.

Follow-Up Service

A follow-up service is an important factor in effective counseling. This enables and aids the counselor to check on the outcomes of his work. If this service is to be performed effectively, a plan must be made for determining the adjustment needs of young workers. Written reports from the students and their employers are desirable. Telephone calls and personal calls at the place of employment are helpful. Calls made by the youth on his former counselor have value and should be encouraged. All members of the staff may well be requested to file written reports or notes about informal talks with former students.

Some of the more important things that youth need help with after leaving high school are: assistance in locating new jobs after leaving the first job, aid in determining what additional information is needed and how to get this information, and help in planning recreational and leisure time activities.

Taking Up the Slack

The unemployed should be guided toward suitable recreational facilities, part time work, evening or part time classes or similar activities. It is difficult to keep in touch with youth after they have left school, but if a feeling of trust and confidence has been built up between the counselor and the student the chances are greater that the student will keep in touch with the counselor when asked to do so.

Conclusion

Counseling is the heart of the guidance program, therefore the counselor must be prepared to meet anyone in the school system on a friendly basis, making him feel at ease to present any problem that is confronting him.

In order that effective counseling can be carried on successfully counselors must have ample information on each student in order to help the student solve his problems. An attempt to collect data on the student is likely to result in a mass of material from which it is difficult to select the needed information but on the other hand too little information is a hindrance to counseling. The counselor must arrange the information so it will aid both him and the student to an optimum.

It is also essential that the counselor be well versed in industrial and occupational opportunities. Such information will enable him to advise intelligently on any problem that may arise about part time jobs, occupational schools, demand for jobs, jobs that are disappearing from industry, duties and qualifications for jobs, and the best procedures for job hunting.

Interviewing is the core of the counseling

system, therefore the counselor must be very diplomatic and tactful and understand very thoroughly the nature of the problems that arise among students. He must build up confidence in his students so that they will be truthful and frank in the discussion of their problems. This cannot be accomplished the first time the interviewer meets the student, therefore the interviewer must devote as much time as he deems necessary to build up mutual confidence.

A follow-up service is very desirable so that the counselor may help students who have left school. This will also aid the counselor in that he may check the organization of the counseling setup of his school to see if they are meeting their objectives.

If a system of counseling, based on worth-while techniques is developed the system will be very successful, if not the results may prove disastrous.

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Tool Kit for Foremen and Supervisors

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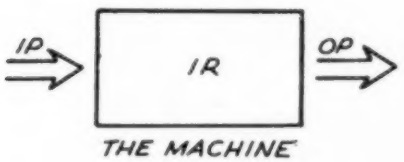
Foremen and supervisors are directly responsible for:

a) What goes into their machines — In Put (IP)

b) What comes out of their machines —Out Put (OP) but only indirectly responsible for:

c) What goes on inside their machines — Internal Reactions (IR)



THE MACHINE

You cannot see what goes on inside the machines (IR), but you can observe many symptoms, evidences, or manifestations such as: noise, heat, friction, too slow, too fast, vibration, appearance, cleanliness, smell, smoke, irregular action, stops, etc. — and strangely enough, many of these symptoms appear both in mechanical machines and in human machines (workers).

What factors are included in these three: IP, IR, and OP?

Foremen and supervisors put into (IP) the mechanical machine two items: materials and skill. They study and observe in the OP three items: production quantity, production quality, and morale. At the same time the foremen and supervisors are constantly observing and checking the symptoms of IR.

In the same way in dealing with the human machine (the workers), the foremen and supervisors put in two items: instructions or orders or requests, and skill in issuing same (IP). For the OP of the human machine (apart from production) foremen and supervisors are constantly checking morale, and the table below will help illustrate this phase of the OP of the human machine.

	Out Put or Result	*Internal Reaction or Cause*
Checking facters	Morale	(Symptoms) Anger, friction, noise, too fast, too slow, heat, irritation, arguments, etc.
	Grouchy workers	
	Complaints	
	Grievances	
	Rumors, etc.	

There are only three methods that can be used to improve internal reactions (IR) of employees, in other words, to improve employer-employee relations:

1st — with *words* — "tell 'em"

2nd — with *things* — tools, machines, physical conditions, etc.

3rd — with *pictures* or *devices* — show 'em

(Pestalozzi said there are two kinds of teachers — those who teach with *words* and those who teach with *things*, but Confucius added a third — "A picture is worth ten thousand words.")

What are some of these pictures or devices that will tend to help control the internal reactions (IR) of workers? In other words how control minds of workers so as to improve employer-employee relations?

Some Devices and How to Use Them

First will be given some problems or troubles; secondly will be given some devices that may be used to help solve them; and thirdly, suggestions on how to use these devices.

The work of the world calls for four steps: (1) spot the problem; (2) what you need to solve or grapple with this problem or trouble; (3) what kind of a tool or device is needed; and (4) how do you use this tool or device.

Problem	*Need to do*	*Kind of tool or device*	*Used How is it used*

We will now discuss some problems or troubles, then show one or more devices that may be used in solving same; and later on, discuss more in detail how these devices may be used in many ways.

Problems, Troubles, and Questions Resulting From or Based on Internal Reactions

PROBLEM No. 1 — How Improve the Morale in the Working Force?

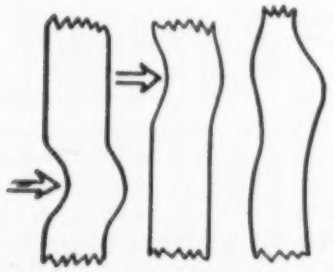
Use devices Nos. 1, 2, and 3.

DEVICE No. 1 — Raise the sights from a kick in the seat of the pants to a pat on the back.

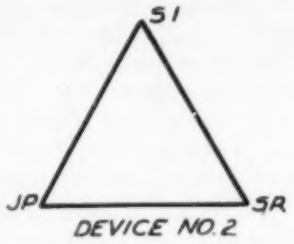
Foremen and supervisors soon learn that in $99\frac{47}{100}$ per cent of all cases morale will be raised by frequent application of this device. "You catch more flies with sugar than with vinegar."

Even necessary criticism and censure may well be accompanied with a pat on the back. In the next device following (No. 2) you will find that two items (self-respect and job pride) are increased by device No. 1.

Also see devices Nos. 2 and 3.



DEVICE NO. 1



DEVICE NO. 2

DEVICE No. 2 — The Three Great Motives.

There are three basic motives back of all human endeavors: self-interest, self-respect or pride, and job pride.

Efficient foremen and supervisors constantly turn to and use one or more of these three. Self-interest involves many items such as more pay, promotion or change in title, better working location, greater responsibility, recognition of authority, and in line for similar recognitions.

Self-respect or pride depends on how the worker is handled — is he treated like a human being or merely a machine? *Bawling out* soon destroys this motive, and censure given in front of others is a sure *killer* of self-respect. This motive accounts for feelings like *keeping up with the gang* or *I don't want to be a tail ender* and *being among the best workers in the plant.*

Job pride is one of the most important motives to cultivate among employees. When the worker acquires job pride he will soon become one of your best workers. When he enjoys his work, when he wants to do a job better, when a good job well done is his chief aim and money second, then you have the millennium. Most foremen and supervisors agree that the following order is best: (*a*) job pride; (*b*) self-respect; (*c*) self-interest. How build up these two items: Self-respect and job pride?

See device No. 1 which certainly will build them up. ....

DEVICE No. 3 — The three C's — Sometimes called *the three-pronged fish spear.*

Both learners and workers will find it profitable to keep in mind that they should always "Keep your eyes on the three C's":

1. *Control* the tools and materials of your work job (below).
2. *Co-operate* with other workers on the same level.
3. *Conform* to the policies of the company and the orders of the boss.

You may hold your payroll job by controlling your own work job, but promotion goes to those who also use the other two prongs of the three-pronged fish spear.

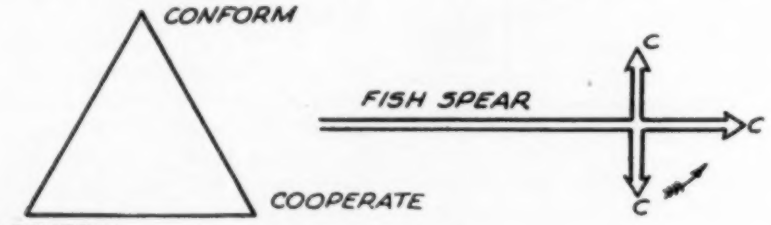
Good morale in the working force results from consideration of the second *C* — co-operation. While production quantity and quality depend more on the first and third *C;* in the long run loyalty, one phase of morale, hinges primarily on the second *C;* — co-operate. Unfortunately, constant effort to improve the productive efficiency tends to place so much emphasis on the first *C* (control your own work job) that the second *C* (co-operation) may be overlooked. I have often seen the best mechanic, who had been a long time on the payroll, passed by when a new foreman was needed simply because the expert worker had never learned to co-

DEVICE NO. 4

operate with others. Like a football player, he could "run the ball" but he had never learned team work and how to "run the team."

PROBLEM No. 2 — How Assign Work Jobs?

DEVICE No. 4 — (Later on under "How Assign Pay Roll Jobs" or "How Start



DEVICE NO. 3

New Employees" other devices may be considered in connection with this same question.)

DEVICE No. 5 — The four W's and one H form the first five-pointed star — one of the five big fives, of "common doing" in all industrial-arts and vocational shops as well as out in industry.

The five *W's* and one *H* are met with in all work jobs.

Both the foreman and the worker must *know:*

1. *What* to do.
2. *How* to do it.
3. *Why* to do it.
4. *Where* to do it.
5. *When* to do it.

We are told that if you know *what* to do, you can get a job; if you also know *how* to do it, you can hold the job; while if you also know *why* you do it, you become the boss.

Later on we will learn that there are four other stars which are part of the *common learnings* in both industrial-arts and vocational shops and out in industry.

The *five big fives* are part of the *common learning* in all shops.

What Is Mitography?

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It is not the purpose of this article to explain a word which describes an important phase of the graphic-arts industry and about which the writer has had inquiries. Lack of knowledge and lack of appreciation of semantics not only creates difficulty educationally, economically, socially, politically, and industrially, but also produces overlapping of the problems from one field into the others. Because words are the result of all of life and experience, it is no mystery as to why many terms are used and misused in the description of a process or an industry. Ever since about 1906 when the American pioneers of silk screen printing (the term *silk screen printing* is employed here because it is more familiar to most people) were developing the industry in garrets, basements, studios, and shops, and when the pennant printer, sign painter, artist, and enterprising supplier were each carving out the industry, there was no time for doing industrial introspection and for standardization of terminology. As a result much *double talk* developed. Just as the need exists for evaluation in the field of education so there is definite need for constant evaluation in an industry, since each contributes to the other.

Silk Screen Printing Not a Comprehensive Term

For some time it has been felt that the term *screen process printing* most accurately describes the process in which the printing is done through a printing plate consisting of a fabric mesh and that *silk screen printing* does not describe the industry comprehensively, since silk is only one of several screen fabrics employed for the printing plate. Although the term screen process printing is comprehensive in its meaning, it consists of three words, it is confused with screen process (look up *screen process* in the dictionary), it is confusing to the novice and the layman, it is not easy to derive defining terms from it, and it is not an easy matter to translate it into other languages. Just try translating *screen process printing* into practical Spanish. A difficult task is to try to clarify screen process to an individual when talking about half-tone screens and screen process printing at the same time. Since we are the leaders in this industry, it is our responsibility to employ a term which describes it extensively and comprehensively.

Mitography

The terms *silk screen printing, screen printing, serigraph, silkgravure, diagravure,* etc., which have been used and are still being employed in reference to the industry and the processes are descriptive but each is not general enough to convey the complete meaning of the process, since each describes a phase of the industry. After much deliberation, the writer at the end of World War II chose the word *mitography* (mī thog′ ra fī) which he coined from the Greek, the prefix *mito* meaning threads or fibers and the suffix *graph* denoting something written or printed.

Specifically, *mitography* deals with the arts or processes employed in the production of printed matter applied onto any surface of varied materials with a squeegee device through a printing plate consisting of a fabric mesh screen that is partly masked, blocked out, or impregnated. Similarly, the term *photomitography* refers to the photographic processes employed in the production of printing plates in the industry. Mitography allows for the derivation of the following terms for which there is definite need in the industry: *mitographer,* a person who works at mitography; *photomitographer,* a person who works at photomitography; *mitograph,* a print produced on any surface or any material by mitography; and the adjective *mitographic* which has the defining function.

The Chamber of Commerce of the United States points out the unreliability of government estimates for government built water-power projects. They are always too small. The Chamber found that of 31 project estimates submitted to Congress, actual completion costs trebled. The estimates were slightly more than a billion and a half, while the actual costs came to more than five and a quarter billion.

Since the war started two years ago, the automobile death toll has rapidly outstripped the losses of servicemen on Korean battlefields. A total of 74,500 persons have been killed in U. S. highway accidents during the two-year period, while 19,350 combat deaths have occurred among American forces in the Korean fighting. — *Association of Casualty and Surety Companies.*

Twenty-five per cent of all chemicals made in this country are derived from petroleum. By 1962, the figure is expected to be close to 50 per cent. — *Petroleum Newsnotes,* American Petroleum Institute, New York City.

Industrial Arts and Vocational Education

John J. Metz, *Editor*

DEVELOPING GOOD PERSONALITY TRAITS

Many studies have been made to discover why there are so many youths and adults who seemingly cannot hold a job. Some of these persons are skilled workmen who as far as their *know-how* is concerned are above par, and yet they have to be dismissed because they cannot get along with their fellow workmen, shop foremen, supervisors, and the like.

Employers want alert, dependable workers, who have or can work up a real enthusiasm for their jobs. They want employees who have the required skills, self-confidence, and initiative, but above all they want workers who can get along with others — men who possess some humor and are willing to help when they see fellow workers in distress.

Troublemakers and talebearers are not wanted in any shop situation. Such people can upset the morale of an entire organization.

Shop teachers know the facts recorded in the foregoing but most of them do little or nothing to alter the conditions mentioned, although much human misery is traceable to them. A man who loses his position is in a deplorable condition. For the unmarried man, unless jobs are plentiful, it means disappointment every time he receives a turndown when he tries to find a new job. Besides this, financial conditions do not improve if the weekly wage is stopped.

The fate of the married man is still worse, especially if there are smaller children in the family. Reduced funds spell unpaid rents, and this means trouble with unfeeling and even harsh landlords. Reduced funds also bring about domestic strife, because debts and scanty food are not cheerfully borne by the mother who has to care for a family.

But what can the teacher in the school shop do about this? Can we stress some of the character traits that a good worker should have, while we are inculcating skills in our industrial arts and vocational education shops? Would it not be advantageous for the student and for his future fellow workers to introduce him to the character traits that he must develop if he wants to succeed later on?

Probably we are attacking a big job, but big jobs are what teachers of industrial arts and vocational education are accustomed to.

HIGH SCHOOL STUDENTS AS SCHOOL-BUS DRIVERS

Schools are giving more and more attention to the training of safe drivers. The results of this work produce such favorable effects that several states are now permitting students who have been properly trained, to act as drivers for the buses used to transport school children.

The January issue of "Safety Education" describes the program instituted by South Carolina in which properly trained high school students have been placed in charge of the school buses.

North Carolina has followed this practice for quite a number of years because the writer, when reading the article in "Safety Education," was reminded of having written an editorial reporting the North Carolina practice in the May, 1938, issue of this magazine.

Both North and South Carolina have found that their youthful drivers have established excellent safety records, despite the common opinion that drivers of high school age are reckless and undependable. The article in "Safety Education" quotes Claude R. McMillan, chief highway commissioner of North Carolina as saying "Student drivers are just as safe and economical as adults." He also estimates that 80 per cent of the drivers are high school students.

Alabama also is trying this method of solving their school-bus driver program.

The standards set up by South Carolina are: candidates must be 16 years of age or over; have enough physical strength to handle the school bus with ease; be of the proper height and weight, and possess normal vision; possess normal hands and feet and be able to use these members in a normal manner. The candidates also must pass a rigid physical and safe driving test.

These young drivers handle about 1600 buses and haul approximately 78,000 pupils to and from the schools.

The success of the programs in operation now may well cause other states to investigate and try out this worth-while scheme. No doubt the students who succeed in acquiring a school bus driver's certificate, arouse the ambition in other students to strive to get one also. This will have the effect of building up worthwhile character traits in an increasing number of our youth, and will definitely increase the number of good automobile drivers in our country.

The Association of Casualty and Surety Companies has released the information that almost three million high school students are now being taught safe driving habits at their schools. The Association also stated that 19 states were recipients of awards in the 1952 National Driver Education Award Program.

Why not let the students who make excellent records in these safe driving courses apply their knowledge and skill in the meritorious task of transporting their younger school mates in school buses wherever these are used?

THE NEW SEMESTER

As the first semester of the school year 1952–53 is nearing its end, the question of testing is again looming large. Space does not permit the introduction of many tests, but those that have been put into this issue, we hope, will be found helpful. It may not be out of order to repeat their titles and the names of the authors who submitted them. All of these tests deserve to be studied, and some of our readers may do well to adopt or adapt them to their own shop use.

The listing here gives them in the order in which they appear in the magazine: "Improvement of Achievement Tests" by Jarvis and Lux; "Safety Demonstration Test" by Gottlieb; "Simple Test on Tool Recognition" by Morris W. Hilyard; "Questions and Answers on Aviation" by Fenn; "Mechanical Drawing Test" by Louis Barocci; and the "Mid-Term Examination on General Metal" by Amos G. Williams.

It is hoped that these samples may be found useful, since testing is very useful despite the fact that some teachers think it wise to abolish all testing. Adherents to the nontesting idea should remember that our students will be tested as to their knowledge and skill by every job that is assigned to them no matter what field they may enter. It is best to get them used to this fact early in life.

TESTING AND TESTS

SAFETY DEMONSTRATION TEST

GORDON KAY GOTTLIEB
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New York City

1. Two boys demonstrate how to place a large stake in a vise and remove it.

2. Remove a handle from a file and demonstrate how dangerous it is to use a file without a handle.

3. In which position should the handles of the gas stoves be to be off?

4. In which position should the handle of the main gas valve be to be off?

5. Demonstrate the safe way to carry a stool.

6. Demonstrate how your clothing should be when you start to work.

7. Show how a piece of work should be placed in a vise. If it is not secure what might happen?

8. Demonstrate what might happen if a hammer head is loose.

9. Two students dramatize what might happen if they were fighting.

10. Point out to the class where students should stand when machines are in operation.

11. Demonstrate what to do when oil or water is spilled on the floor.

12. Demonstrate how one might get hurt using a hand drill.

13. Show what is to be done with stools when work begins.

14. Show what might happen if a mushroomed punch is used.

15. Show where hot objects should be placed to cool.

16. Show what is to be done if an accident occurs.

A SIMPLE TEST ON TOOL RECOGNITION

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The following test is especially well suited to the industrial-arts shop which has open type tool panels. It is a test which is simple and easy to make, consisting merely of a list of perhaps one hundred tools and machines, part of which are on display in the shop and part of which are either not on display or are not in the shop at all. Directions at the beginning of the test tell the students to cross out the names of the tools and machines which are not on display.

This test can be given to a group in ten to twelve minutes and quickly graded from a master copy.

QUESTIONS AND ANSWERS ON AVIATION

ISADORE M. FENN
Chicago, Ill.

The Student Pilot[1]

Q. 1. How is the airplane controllable in the three dimensions of space?
Ans. By three basic controls: (1) the stick, (2) the rudder, (3) the throttle.
Q. 2. Is the structure of an airplane absolutely rigid?
Ans. No. To absorb the stresses to which it is subjected, it has a certain amount of flexibility.
Q. 3. Is a great amount of physical effort required to fly the modern airplane?
Ans. No.
Q. 4. How do reliable pilots operate the controls of an airplane?
Ans. In a smooth manner, no matter how fast the action may be.
Q. 5. What is an essential characteristic of conservative flying?
Ans. To keep within the speed limits prescribed for the maneuver.
Q. 6. In training how much time should be allowed for the first flight?
Ans. It should not exceed 45 minutes.
Q. 7. State the three main categories of the progressive program of flight instruction.
Ans. (1) Basic maneuvers, (2) advanced, (3) acrobatic.

Aircraft Assembly[2]

Q. 1. What is aircraft assembly?
Ans. Attaching together many detail parts which make up a complete airplane.
Q. 2. What kind of equipment is needed in aircraft assembly?
Ans. (1) Assembly jigs, (2) attachment elements, (3) drilling equipment, (4) hand-riveting equipment, (5) riveting machines, (6) welding equipment.
Q. 3. What are the main structural elements of the wings?
Ans. Spars.
Q. 4. What is the most common type wing?
Ans. Two spar wing.
Q. 5. Name the different types of wing-spar assemblies?
Ans. (1) Monospar, (2) two spar, (3) multispar.
Q. 6. Name two types of aluminum spars?
Ans. Web or truss types.
Q. 7. Which type aluminum spar is the most popular?
Ans. Web type; because it is generally lighter than the truss spar.
Q. 8. What is the technical name of the web spar?
Ans. Wagner beam.
Q. 9. Name two classes of ribs?
Ans. Web type and truss type.
Q. 10. What is used to attach fiber gussets to wooden rib members?
Ans. Animal, vegetable or synthetic glues.
Q. 11. What is a vertical wing jig?
Ans. One in which the spars are laid horizontally, one placed above the other with the ribs and skin placed vertically.
Q. 12. Where is a vertical wing jig employed?
Ans. In the assembly of the wing box beam. Riveting of the skin is much easier for the men as they can stand upright beside the work.
Q. 13. What are some of the present tendencies in wing construction?
Ans. (1) Monocoque designs, (2) higher wing loadings, (3) greater surface smoothness.
Q. 14. Name the various airplane control surfaces?
Ans. Ailerons, elevators, flaps, rudders, fin stabilizer, and trim and balance tabs.

Aviation From Shop to Sky[3]

Q. 1. What is a "mock-up" of an airplane?
Ans. A replica of the airplane made from wood or composition materials instead of dural, steel, and aluminum.
Q. 2. What is meant by "drag"?
Ans. The backward strain on each wing when a plane is in flight.
Q. 3. When is a propeller "feathered"?
Ans. When its planes are parallel to the line of flight and are thus deprived of their propelling power.
Q. 4. In aviation, how is possible failure guarded against?
Ans. By exhaustive and expensive tests.

Aircraft Inspection Methods[4]

Q. 1. What are the principal raw materials in common use in aircraft construction today?
Ans. (1) Steel, (2) aluminum and its alloys, (3) alloy steels, (4) magnesium alloys, (5) wood, (6) plastics.
Q. 2. What are the duties of the inspector of raw material?
Ans. (1) To see that there are no physical defects in the material. (2) To see that the material is the size and shape required. (3) To see that the physical

[1]Based on material from *The Student Pilot's Training Primer* by Hugh J. Knerr, 1941. Published by D. Van Nostrand Co., 250 Fourth Ave., New York, N. Y.
[2]Based on material from *Aircraft Assembly* by C. F. Marschner, 1942. Published by Pitman Publishing Corp., 2-6 West 45 St., New York 19, N. Y.
[3]Based on material from *Aviation From Shop to Sky* by John J. Floherty, 1941. Published by J. B. Lippincott Co., 521 Fifth Ave., New York, N. Y.
[4]Based on material from *Aircraft Inspection Methods* by Niles C. Bartholomew, 1940. Published by Pitman Publishing Corp., 2-6 West 45 St., New York 19, N. Y.

and chemical properties of the material ordered are correct.

Q. 3. Name the tools required by the inspector of raw stock?

Ans. (1) Micrometers, (2) tube mircometers, (3) inside calipers, (4) outside calipers, (5) rule, (6) steel tape.

Q. 4. Should the inspector be familiar with the major characteristics of the common metals?

Ans. Yes. He should be able to recognize them from a knowledge of their physical and chemical properties.

Q. 5. What wood is used most commonly in aircraft construction?

Ans. Spruce. Lengths up to 35 ft. and as large as 8 in. wide can be obtained.

Q. 6. List other woods used in aircraft construction?

Ans. Douglas fir, white pine, ash, basswood, cedar, maple, birch, and mahogany.

Q. 7. What company manufactures a material known as "Alclad"?

Ans. The Aluminum Company of America.

Q. 8. How is "Alclad" made?

Ans. It is manufactured by coating aluminum alloy with pure aluminum.

Q. 9. Is pure aluminum resistant to salt-water corrosion?

Ans. Yes. "Alclad" metal embodies this principle.

Q. 10. Name several kinds of rivets.

Ans. (1) Brazier head, (2) button head, (3) countersunk head, (4) countersunk oval head, (5) flat head, (6) mushroom head, (7) round head.

Q. 11. Name a new test for detecting faulty welding?

Ans. The magnaflux test.

Q. 12. Describe the magnaflux test.

Ans. The material which is tested is magnetized. The material is then placed in oil containing small fine particles of black magnetic iron oxide. The particles cling to the surface of the flaw or crack because of the polarity which is set up by the magnetizing current.

Q. 13. Name the kind of steels that are very well suited to electric spot welding?

Ans. Stainless steels.

Q. 14. From what material should nails, screws, and rivets used in aircraft woodwork be made?

Ans. Copper or brass. Cement coated nails are also used.

Q. 15. Why is dope-proof paint brushed on surfaces which come in contact with the fabric?

Ans. To protect the finished airplane panel from airplane *dope*.

Q. 16. What is the body of an airplane called?

Ans. Fuselage.

Q. 17. What is the body of a flying boat using floats for landing called?

Ans. Hull.

Q. 18. What are the longitudinal strength members of the fuselage called?

Ans. Longerons. Two upper and two lower.

Q. 19. What are the transverse strength members of the fuselage called?

Ans. Frames and bulkheads.

Q. 20. What is the "firewall" in the fuselage of an airplane?

Ans. The solid bulkhead which separates the engine compartment from the fuel tanks and crew.

Q. 21. Should wood in contact with metal be used in aircraft work?

Ans. No. Suitable insulating material should be provided.

Q. 22. Should split-end taper pins be used in aircraft work?

Ans. No. Taper pins secured with nut and cotter pin may be used.

Q. 23. What kind of bolts must be used in power plant and air control systems?

Ans. Clevis bolts with shear nuts properly cottered.

Q. 24. How many threads should turnbuckles assembled on the finished airplane show?

Ans. Not more than 3 threads exposed on the shanks, nor three threads exposed inside the barrel.

Q. 25. Why is the use of fiber lock nuts on exhaust systems not satisfactory?

Ans. The locking fiber is burnt out by the heat. The use of castellated nuts and cotter pins is more satisfactory.

Q. 26. Should oil tubing be led over exhaust manifolds or electrical wiring?

Ans. No.

Q. 27. How much of an inside radius should bends in oil tubing have?

Ans. Not less than three times the outside diameter of the tubing.

Q. 28. What does the ignition system consist of?

Ans. (1) The ignition switch for each engine, (2) the magnetos, (3) the booster, (4) the spark plugs.

Q. 29. Are the magnetos on most radial engines timed to function at the same instant?

Ans. Yes.

Q. 30. What are the two means of transmitting braking action from the foot pedal to the brake drum?

Ans. Mechanical and hydraulic.

Q. 31. Are some stabilizers adjustable?

Ans. Yes. They allow an increase or decrease from normal in the angle of incidence.

Q. 32. Should bolts in aircraft be installed vertically or horizontally?

Ans. Vertically, with nut down. This will keep bolts from falling out if the nut comes off.

Q. 33. Should the control stick be perpendicular or horizontal when the ailerons are neutral?

Ans. Perpendicular.

Q. 34. Name the two types of wing flaps?

Ans. Single acting and split.

Aircraft Inspection[5]

Q. 1. What are the characteristics of the true aircraft inspector?

Ans. (1) Loyalty to employer, (2) thoroughness in the tasks he is to do, (3)Co-operative and constructive attitudes, (4) willingness to share knowledge with production personnel.

Q. 2. What is an assembly aircraft blueprint?

Ans. A drawing of two or more individual pieces joined together to form a unit which is to be installed on another assembly or in the airplane itself.

Q. 3. What is an installation aircraft blueprint?

Ans. A drawing showing where and how parts and assemblies are installed in the aircraft.

Q. 4. What are dash numbers?

Ans. Numerals beginning with one prefixed with a dash in numerical sequence to the maximum numeral required. This is for identification purposes on blueprints. The dash number enclosed in a circle, is found near the part it identifies.

Q. 5. What are reference blueprints?

Ans. Prints which show proposed outlines and design features that must be proved by the production of material models of the pictured idea. These prints are not for use in production.

Q. 6. What is a production blueprint?

Ans. An exact copy of the part, assembly, or installation, that is to be made.

Q. 7. Why are rivets of alloys 17S, A17S, and 24S supplied with an anodic coating if such a coating is specified?

Ans. This anodic coating improves the resistance of the rivets to corrosion. A better surface for painting is provided.

Q. 8. What is the only way in which rivets can be returned to the soft condition?

Ans. By reheat-treatment.

Q. 9. What does the pressure required to drive rivets depend upon?

Ans. The size and type of rivet and the driving temperature.

Q. 10. How are rivet holes made in aluminum alloy materials?

Ans. They are drilled, punched, or counterpunched.

Q. 11. What should be the diameter of the point of a rivet after driving?

Ans. One and one-half times the diameter of the rivet.

Q. 12. What are "Cleco Sheet Holders"?

Ans. Fasteners used to locate and hold metal sheets to each other and to adjoining structural members. Each fastener is a small steel cylinder with a spring-actuated locking plunger.

Q. 13. Why are "Cleco Sheet Holders" used?

Ans. To keep the material from slipping while driving rivets and to prevent the rivets from squeezing out between the parts of the joint.

Q. 14. Where are lockwashers used?

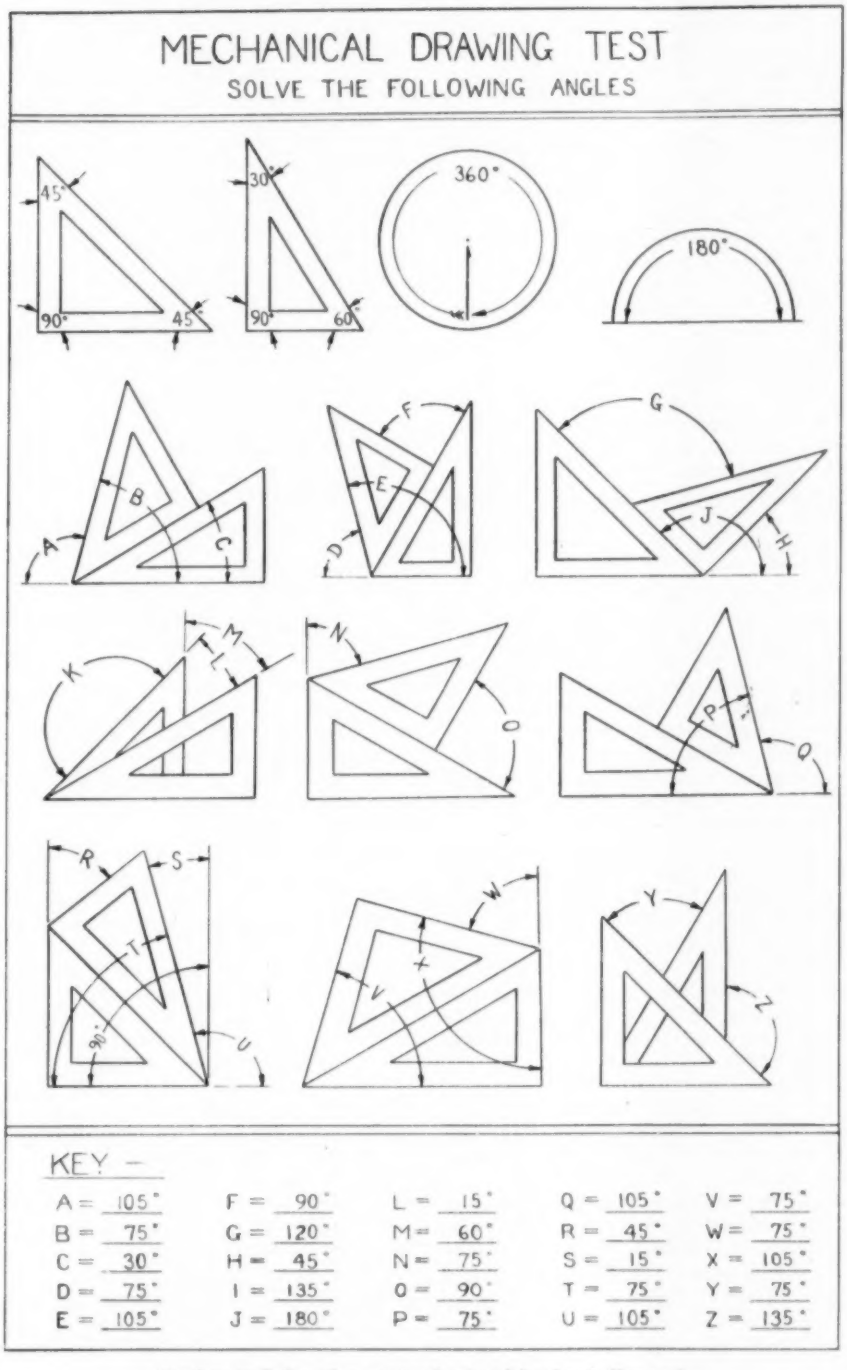
Ans. Where cotterpins or safety wire is not called for on the blueprint.

Q. 15. What is the purpose of cotterpins?

Ans. To make safe a bolt of clevis-pin installation.

[5]Based on material from *Aircraft Inspection* by Ernest E. Wissman, 1942. Published by McGraw-Hill Book Co., 330 West 42 St., New York 18, N. Y.

Q. 16. What is the purpose of safety wire?
Ans. It is used on dulled-head bolts and nuts to maintain tightness.
Q. 17. What is meant by "bonding" parts in preventing radio disturbances?
Ans. Making a good electrical connection between the two parts.
Q. 18. Is it practical to divide inspection of workmanship on aluminum and its alloys into two classes?
Ans. Yes. The two classes are structure and plating (skin cover).
Q. 19. What is "subassembly"?
Ans. Putting together one or more fabricated parts into a unit.
Q. 20. With what other items besides assembly and installation blueprints is the aircraft inspector required to be familiar?
Ans. Specifications, processes, authorized shop practices, and accepted aircraft standards of workmanship.
Q. 21. In the inspection of the flight control system name the parts which make up the system.
Ans. (1) Control surfaces, (2) structural supports and guides, (3) cables and control tubes, (4) operating the system.



Mechanical drawing test submitted by Louis Barocci, High School, Cudahy, Wis.

GENERAL METAL – MID-TERM EXAMINATION

AMOS G. WILLIAMS
Southeast Missouri State College
Cape Girardeau, Mo.

Texts: Ludwig, O. A., *Metalwork Technology and Practice* (Bloomington, Ill.: McKnight & McKnight).

Jennings, R. E., *Gas and A.C. Arc Welding and Cutting* (Bloomington, Ill.: McKnight & McKnight).

Multiple-Choice Examination: Each of the following statements has five possible answers. One of the five answers is correct. Identify your answer by recording the proper letter in the space provided.

( ) 1. In the skilled metal trades, a highly trained individual who is able to set up and operate any standard machine tool is known as a: (*a*) machine operator, (*b*) lathe hand, (*c*) millwright, (*d*) machinist, (*e*) mechanic.

( ) 2. For safety's sake, an individual working around metal processing machines should: (*a*) wear loose clothing and gloves, (*b*) have his sleeves rolled and tie tucked in shirt, (*c*) protect long hair with a sombrero, (*d*) tape his finger rings securely in place, (*e*) run, not walk, to the nearest exit.

( ) 3. For greater chances of promotion as a skilled craftsman in a metal trade, a young man should have completed a period of apprenticeship, and: (*a*) be a graduate of a standard secondary school, (*b*) have had work in a Liberal Arts Junior College, (*c*) be a graduate of a Technical High School or of an approved Vocational Trade School, (*d*) have an eighth-grade education, (*e*) have his main interest centered on Trade Union politics.

( ) 4. In drawfiling, one may reduce the accumulation of metal particles in the file by rubbing the teeth with: (*a*) resin, (*b*) cup grease, (*c*) graphite, (*d*) chalk, (*e*) beeswax.

( ) 5. The process of separating metals from the rocks and earth in which they are found, and processing them for useful things, is called: (*a*) manufacturing, (*b*) machining, (*c*) metallurgy, (*d*) meteorology, (*e*) malleability.

( ) 6. Iron pipe is manufactured: (*a*) in the blooming mill, (*b*) by a cold rolled process, (*c*) by a cold drawn process, (*d*) usually of seamless tubing, (*e*) by a hot rolled and hot drawn process.

( ) 7. An alloy of 20 per cent nickel and 80 per cent gold is called: (*a*) German silver, (*b*) pewter, (*c*) fool's gold, (*d*) white gold, (*e*) monel metal.

( ) 8. The Jacobs drill chuck is designed for twist drills having a: (*a*) bit stock shank, (*b*) straight shank, (*c*) taper shank, (*d*) ratchet shank, (*e*) blacksmith's shank.

( ) 9. In relation to the axis, the cutting lip of a twist drill should usually be sharpened at an angle of: (*a*) 127 degrees, (*b*) 68 degrees, (*c*) 29 degrees, (*d*) 59 degrees, (*e*) 12 degrees.

( ) 10. In drilling cast iron, one should: (*a*) use lard oil, (*b*) use cutting oil, (*c*) drill it dry, (*d*) use soda water as a coolant, (*e*) use a soluble oil as a coolant.

( ) 11. In reaming a hole, whose finished diameter is to be one inch or less, the reamer should remove no more material from the diameter of the hole than: (*a*) 1/16 in., (*b*) 7/32 in., (*c*) 3/16 in., (*d*) 3/32 in., (*e*) 1/64 in.

( ) 12. In an American Standard (National) screw plate, with sizes ranging from ¼ in. to 1 in., the taps and dies marked N.C. correspond to the: (*a*) E.F. thread, (*b*) S.A.E. thread, (*c*) V thread, (*d*) U.S.S. thread, (*e*) A.S.M.E. thread.

( ) 13. Nuts and bolt heads which are in a recess hole below the surface of the work usually are adjusted with: (*a*) a socket wrench, (*b*) a spanner wrench, (*c*) an offset screw driver, (*d*) a box wrench, (*e*) an S wrench.

( ) 14. A pulley or collar is often fastened to a shaft with a: (*a*) thumb screw, (*b*) cotter pin, (*c*) stud bolt, (*d*) tapered pin, (*e*) machine screw.

( ) 15. The American Standard Pipe Thread: (*a*) is tapered and V shaped, (*b*) has the same form as the U.S.S. thread, (*c*) has the same form as the S.A.E. thread, (*d*) has the same form as the American (National) Standard, coarse, and fine thread series.

( ) 16. A star drill is used to drill holes in: (*a*) tool steel, (*b*) wood, (*c*) masonry, (*d*) sheet metal, (*e*) brass.

( ) 17. To remove lumps from the surface of a raised bowl, by using a highly polished hammer and stake, is called: (*a*) chasing, (*b*) planishing, (*c*) fluting, (*d*) peening, (*e*) tapping.

( ) 18. In forging practice, the smith must have an assistant whenever he uses the: (*a*) hardy, (*b*) hand hammer, (*c*) tongs, (*d*) anvil, (*e*) hot chisel.

( ) 19. The process of removing a small degree of hardness from a piece of hardened tool steel is called: (*a*) annealing, (*b*) tempering, (*c*) case hardening, (*d*) hardening, (*e*) carburizing.

( ) 20. In foundry practice, the form into which molten metal is poured for casting a desired shape is called a: (*a*) pattern, (*b*) flash, (*c*) core, (*d*) mold, (*e*) drag.

( ) 21. In the industrial metal trades, an individual having one of the broader backgrounds of technical knowledge and skills is the: (*a*) apprentice machinist, (*b*) master toolmaker, (*c*) master plumber, (*d*) journeyman instrument maker, (*e*) apprentice millwright.

( ) 22. In cutting thin-walled tubing or thin sheet metal with a hand hack saw, one should choose a blade having: (*a*) 18 points per inch, (*b*) 24 points per inch, (*c*) 48 points per inch, (*d*) 14 points per inch, (*e*) 32 points per inch.

( ) 23. The accumulation of metal particles between the teeth of a file are known as: (*a*) chips, (*b*) shavings, (*c*) lumps, (*d*) pins, (*e*) plugs.

( ) 24. Any metal having iron as its main ingredient is known as: (*a*) malleable metal, (*b*) a bessemer alloy, (*c*) an alloy steel, (*d*) an ingot, (*e*) a ferrous metal.

( ) 25. Steel which contains one or more of the following: nickel, chromium, manganese, molybdenum, tungsten, or vanadium is known as: (*a*) machine steel, (*b*) ingot steel, (*c*) alloy steel, (*d*) bessemer steel, (*e*) tool steel.

( ) 26. An alloy containing equal parts of tin and lead is called: (*a*) babbitt, (*b*) solder, (*c*) German silver, (*d*) pewter, (*e*) monel.

( ) 27. The rake angle of a twist drill is: (*a*) 18–27 degrees, (*b*) the same as the lip clearance angle, (*c*) the angle between the flute and the work, (*d*) changed each time the drill is resharpened, (*e*) 120–135.

( ) 28. A taper shank twist drill is removed from the spindle with a: (*a*) center punch, (*b*) pin spanner, (*c*) machine punch, (*d*) face spanner, (*e*) drill drift.

( ) 29. The operation of machining a drilled hole to receive a fillister head screw is known as: (*a*) reaming, (*b*) countersinking, (*c*) counterboring, (*d*) spot-facing, (*e*) tapping.

( ) 30. The final threading operation in tapping a blind hole is accomplished with a: (*a*) screw extractor, (*b*) bottoming tap, (*c*) tap wrench, (*d*) plug tap, (*e*) taper tap.

( ) 31. Heavy machinery is usually fastened to a wooden floor with: (*a*) cap screws, (*b*) machine screws, (*c*) setscrews, (*d*) wood screws, (*e*) lag screws.

( ) 32. The American Standard Pipe sizes were standardized many years ago by: (*a*) Henry Ford, (*b*) Pratt & Whitney, (*c*) Robert Briggs, (*d*) Brown & Sharpe, (*e*) L. J. Starrett.

( ) 33. Rivet holes are usually made in sheet metal by using a: (*a*) hollow punch, (*b*) drill press, (*c*) prick punch, (*d*) center punch, (*e*) solid punch.

( ) 34. The process of joining two pieces of metal by heating adjacent portions until they melt together is called: (*a*) welding, (*b*) soft soldering, (*c*) casting, (*d*) hard soldering, (*e*) brazing.

( ) 35. In forging practice, the most common flux for welding mild steel is: (*a*) clean sand, (*b*) rosin, (*c*) zinc chloride, (*d*) powdered borax, (*e*) Kasenit.

( ) 36. In foundry practice, the intentional taper given the sides of a pattern is called the: (*a*) shrink, (*b*) drag, (*c*) cope, (*d*) core, (*e*) draft.

( ) 37. In the metal industries, a career requiring the broadest background of technical education is the: (*a*) master machinist, (*b*) mechanical engineer, (*c*) chief draftsman, (*d*) master steam fitter, (*e*) master watchmaker.

( ) 38. A file that is recommended for narrow work, such as keyways, slots, and grooves, is a: (*a*) pillar file, (*b*) mill file, (*c*) rattail file, (*d*) flat file, (*e*) three-square file.

( ) 39. A diemaker is a highly skilled metalworker who: (*a*) designs and builds micrometric measuring gauges, (*b*) makes metal forms used in punch presses, (*c*) specializes in the operation of milling machines, (*d*) makes metal forms used in drop-forging hammers, (*e*) is also called a die sinker.

( ) 40. The metal known earliest to man was: (*a*) iron, (*b*) gold, (*c*) tin, (*d*) copper, (*e*) lead.

( ) 41. To accommodate a taper shank twist drill in a spindle that was designed for a larger taper, one must: (*a*) use a taper sleeve, (*b*) change to a larger drill, (*c*) regrind the drill shank, (*d*) use a drill socket, (*e*) tighten the shank with a chuck key.

( ) 42. In production drilling, a drill press is fitted with a: (*a*) drill vise, (*b*) variety of clamps, (*c*) drill jig, (*d*) V blocks, (*e*) die.

( ) 43. The operation of machining a drilled hole to receive a flat head machine screw is known as: (*a*) reaming, (*b*) countersinking, (*c*) counterboring, (*d*) spot-facing, (*e*) peening.

( ) 44. Finished nuts, bolts, and cap screws should never be adjusted with: (*a*) an open-end wrench, (*b*) pipe wrench, (*c*) box wrench, (*d*) monkey wrench, (*e*) adjustable end wrench.

( ) 45. The words woodruff, gib-head, square, and feather, refer to metal fastenings called: (*a*) pins, (*b*) rivets, (*c*) keys, (*d*) nuts, (*e*) screws.

( ) 46. Tubing and pipe can be bent most easily when cold by using: (*a*) sledge hammer, (*b*) an electro-spot welder, (*c*) a hickey, (*d*) a pipe wrench, (*e*) a pair of gas pliers.

( ) 47. The joining of metal surfaces with spelter is called: (*a*) fusing, (*b*) casting, (*c*) soldering, (*d*) welding, (*e*) brazing.

( ) 48. The process of removing the hardness

from tool steel, as completely as possible, is called: (*a*) tempering, (*b*) carburizing, (*c*) magnetizing, (*d*) annealing, (*e*) forging.

( ) 49. To prepare molding sand for ramming, the objectionable lumps or particles should be screened from it with a: (*a*) bellows, (*b*) riddle, (*c*) sprue, (*d*) flour sieve, (*e*) strike bar.

( ) 50. Flexible hack-saw blades: (*a*) have the back of the blade annealed, (*b*) are made of machinery steel, (c) have the teeth annealed, (*d*) have a uniform hardness throughout, (*e*) have a brittle cross section.

( ) 51. To cut properly with a hand hack saw, one must: (*a*) usually fit the blade with the teeth pointing toward the handle, (*b*) keep the wrists flexible when sawing, (*c*) allow only the shoulders and elbows to bend, (d) use light, rapid strokes, (*e*) balance the frame in one hand at approximately 60 degrees with the horizontal.

( ) 52. Any metalworker should be able to: (*a*) make inked tracings, (*b*) letter with skill, (*c*) make finished blueprints, (*d*) make perspective drawings, (*e*) make freehand technical sketches.

( ) 53. When ordering a file you should specify: (*a*) weight, size, kind, quality, (*b*) length, shape, cut, spacing, (*c*) use, number, cost, kind, (*d*) size, weight, grit, type, (*e*) cut, measure, kind, size.

( ) 54. In fitting precision surfaces such as lathe beds, surface plates, or journals, the final operation consists of: (*a*) grinding, (*b*) hand scraping, (*c*) belt sanding, (*d*) whetting, (*e*) filing.

( ) 55. High-carbon steel is frequently used in manufacturing such articles as: (a) sheet steel, pipe, chains, and rivets, (*b*) nails, bolts, structural steel members, and auto bodies, (*c*) axles, forgings, auto wheels, and rails, (d) reamers, taps, twist drills, and files, (*e*) gears, pistons, connecting rods, and crankshafts.

( ) 56. An alloy of 89 per cent tin, 7 per cent antimony, and 4 per cent copper is called: (*a*) monel metal, (*b*) tin plate, (*c*) pewter, (*d*) bronze, (*e*) babbitt metal.

( ) 57. The metal which can be beaten into the thinnest sheet is: (*a*) silver, (*b*) copper, (*c*) lead, (*d*) aluminum, (*e*) gold.

( ) 58. A complete series of number drills contains: (*a*) 40 drills, (*b*) 50 drills, (*c*) 60 drills, (*d*) 70 drills, (*e*) 80 drills.

( ) 59. A twist drill will remove a single shaving from the work if the: (*a*) lip clearance angles are too small, (*b*) the web is too thick, (*c*) lip angles are too large, (*d*) flutes are too shallow, (*e*) lips are of unequal angles.

( ) 60. To convert the r.p.m. of a twist drill into peripheral cutting speed, the mathematical procedure is as follows: (*a*) (12 × dia. × pi) divided by r.p.m. equals speed in ft./min., (*b*) (dia. × pi × r.p.m.) divided by 12 equals speed in ft./min., (*c*) (pi × 12 × r.p.m.) divided by dia. equals speed in ft./min., (*d*) (dia. × r.p.m. × 12) divided by pi equals speed in ft./min., (e) (r.p.m. × 12) divided by (pi × dia.) equals speed in ft./min.

( ) 61. On an American Standard Screw, the distance from the center of one thread to the center of a neighboring thread is called the: (*a*) root dia., (*b*) crest, (*c*) gullet, (*d*) outside dia., (*e*) pitch.

( ) 62. One should choose a tap drill whose diameter is equal to or slightly larger than the: (*a*) crest, (*b*) pitch diameter, (*c*) outside diameter, (*d*) pitch, (*e*) root diameter.

( ) 63. To loosen a taper pin in a shaft, one should first use a: (*a*) pin punch, (*b*) center punch, (*c*) drift punch, (*d*) prick punch, (*e*) solid punch.

( ) 64. Thin sheets of metal used for accurately adjusting the two halves of a bearing journal are called: (*a*) lock washers, (*b*) flat washers, (*c*) spring washers, (*d*) shims, (*e*) jam nuts.

( ) 65. Before assembling pipe fittings, the threads should be smeared with: (*a*) shellac, (*b*) liquid solder, (*c*) red lead, (*d*) roofing asphalt, (*e*) creosote.

( ) 66. Metal formed in a broad, thin sheet is called sheet metal if it is: (*a*) 1 in., or less, thick, (*b*) 3/16 in., or less, thick, (*c*) 1/64 in., or less, thick, (*d*) 5/16 in., or less, thick, (*e*) 1/2 in., or less, thick.

( ) 67. The joining of metal surfaces, with an alloy which melts at a low temperature (below red heat), is called: (*a*) brazing, (*b*) welding, (*c*) soldering, (*d*) casting, (*e*) fusing.

( ) 68. In forging practice, the smith may work alone whenever he uses the: (*a*) blacksmith's punch, (*b*) hardy, (*c*) top fuller, (*d*) swages, (*e*) flatter.

( ) 69. When polished steel is being heated, the temper colors appear in the following order: (*a*) blue, brown, purple, yellow, straw, (*b*) yellow, straw, brown, purple, blue, (*c*) straw, yellow, blue, purple, brown, (*d*) purple, blue, yellow, straw, brown, (*e*) blue, purple, straw, brown, yellow.

( ) 70. In the foundry practice, the air, steam, and gas is allowed to escape from a mold through special openings called: (*a*) gates, (*b*) vents, (*c*) sprues, (*d*) risers, (*e*) cores.

( ) 71. The marking of lines, circles, and arcs on metal surfaces is known as making: (*a*) a templet, (*b*) a measurement, (*c*) an intersection, (*d*) a pattern, (*e*) a layout.

( ) 72. The cutting strokes per minute of a power hacksaw should be about: (*a*) 75 with coolant, or 40 if dry, (*b*) 100 with coolant, or 55 if dry, (*c*) 50 with coolant, or 30 if dry, (*d*) 140 with coolant, or 75 if dry, (*e*) 400 with coolant, or 175 if dry.

( ) 73. Natural abrasive crystals used in industry are: (*a*) crystolon, sandstone, aloxite, (*b*) emery, carborundum, alundum, (*c*) sandstone, crocus, crystolon, (*d*) rottenstone, emery, corundum, (*e*) aloxite, carborundum, alundum.

( ) 74. Most of the steel of this country is made: (*a*) by the Bessemer process, (*b*) in the open hearth, (*c*) in the electric furnace, (*d*) in the crucible furnace, (*e*) in the blast furnace.

( ) 75. An alloy containing 1/3 copper and 2/3 nickel is called: (*a*) German silver, (*b*) monel metal, (*c*) bronze, (*d*) brass, (*e*) babbitt metal.

( ) 76. For sizes of 1/2 in., or less, the size of a straight shank twist drill is the same as the diameter of the: (*a*) body clearance, (*b*) flutes, (*c*) web, (*d*) shank, (*e*) heel.

( ) 77. C clamps, parallel clamps, T-slot bolts, V blocks, and goose neck clamps are all used for the purpose of: (*a*) laying out, (*b*) sanding and filing operations, (*c*) setting up work on machine tables, (*d*) bench fitting and assembling, (*e*) pipe fitting.

( ) 78. The American (National) Standard screw thread is an outgrowth of the: (*a*) Acme thread, (*b*) United States Form thread, (*c*) American Society of Mechanical Engineers thread, (*d*) Seller's V thread, (*e*) Society of Automotive Engineers' thread.

( ) 79. The cylinder heads of internal combustion engines are frequently secured with: (*a*) stud bolts, (*b*) machine bolts, (*c*) cap screws, (*d*) tap bolts, (*e*) stove bolts.

( ) 80. The words truss, countersunk, pan, steeple, flat, button, cone, round, and oval all describe types of heads of metal fasteners called: (*a*) pins, (*b*) screws, (*c*) rivets, (*d*) keys, (*e*) bolts.

( ) 81. The sizes of common iron pipe and steel pipe are given as the: (*a*) nominal outside diameter, (*b*) nominal inside diameter, (*c*) actual outside diameter, (*d*) actual inside diameter, (*e*) weight per foot.

( ) 82. An edge or border, made by folding, which stiffens the sheet of metal and does away with the sharp edge, is called: (*a*) a seam, (*b*) a fold, (*c*) a hem, (*d*) a lap, (*e*) a joint.

( ) 83. To solder smoothly: (*a*) the soldering copper must be at red heat, (*b*) an acid flux must always be used, (*c*) the solder must always be a 50/50 alloy of tin and lead, (*d*) the soldering copper must not be overly large, (*e*) the joint must be heated above the melting temperature of the solder.

( ) 84. In forging practice, the stretching or lengthening of hot metal is called: (*a*) tapering, (*b*) offsetting, (*c*) drawing out, (*d*) upsetting, (*e*) flaring.

( ) 85. The active and dangerous ingredient

of certain compounds used commercially for case hardening is: (*a*) sal ammoniac, (*b*) zinc chloride, (*c*) potassium sulphide, (*d*) ammonium sulphide, (*e*) potassium cyanide.

( ) 86. In heating carbon tool steel, when the critical temperature is reached the steel becomes: (*a*) annealed, (*b*) nonmagnetic, (*c*) hardened, (*d*) tempered, (*e*) magnetic.

( ) 87. A furnace that is used to melt large amounts of metal in a foundry is called: (*a*) a blast furnace, (*b*) an open hearth furnace, (*c*) a crucible, (*d*) a cupola, (*e*) a melting furnace.

( ) 88. The coarser of the following abrasive grits is: (*a*) 60 grit, (*b*) 80 grit, (*c*) 100 grit, (*d*) 120 grit, (*e*) 150 grit.

( ) 89. The finest grades of high speed cutting tools and dies used in the machine tool industry are products of: (*a*) the crucible furnace, (*b*) the blast furnace, (*c*) the electric furnace, (*d*) the open hearth furnace, (*e*) the Bessemer converter.

( ) 90. If the cutting speed of a 3/16-in. twist drill in brass is 80 ft./min. the drill revolves at the rate of: (*a*) 1850 r.p.m., (*b*) 378 r.p.m., (*c*) 1630 r.p.m., (*d*) 766 r.p.m., (*e*) 2520 r.p.m.

( ) 91. An alloy of copper and tin is called: (*a*) German silver, (*b*) solder, (*c*) brass, (*d*) pewter, (*e*) bronze.

( ) 92. In production drilling, the twist drill is guided into the work by means of: (*a*) dowel pins, (*b*) parallels, (*c*) bushings, (*d*) center punch marks, (*e*) a coolant.

( ) 93. The cutting speed of a ½-in. twist drill revolving at 229 r.p.m. is: (*a*) 30 ft./min., (*b*) 25 ft./min., (*c*) 43 ft./min., (*d*) 19 ft./min., (*e*) 87 ft./min.

( ) 94. In an American Standard (National) screw plate, with sizes ranging from ¼ in. to 1 in., the taps and dies marked N.F. correspond to the: (*a*) A.S.M.E. thread, (*b*) U.S.S. thread, (*c*) V thread, (*d*) S.A.E. thread, (*e*) E.F. thread.

( ) 95. Seamless drawn tubing is usually measured and ordered by the: (*a*) inside diameter, (*b*) outside diameter, (*c*) inside diameter and gauge thickness of the metal, (*d*) outside diameter and gauge thickness of the metal, (*e*) individual rules of each manufacturer.

( ) 96. Special anvils used by a sheet-metal worker are called: (*a*) bench plates, (*b*) stakes, (*c*) formers, (*d*) groovers, (*e*) punches.

( ) 97. In forging practice, the bending fork and the bending jig are commonly used to form: (*a*) chain links, (*b*) eye bolts, (*c*) spirals, (*d*) scrolls, (*e*) double offsets.

( ) 98. The cheapest quality, low-grade steel is a product of the: (*a*) Bessemer converter, (*b*) open hearth furnace, (*c*) crucible furnace, (*d*) electric furnace, (*e*) blast furnace.

( ) 99. Screws having their points shaped as cone, dog, hanger, flat, cup, or round points are known as: (*a*) wood screws, (*b*) lag screws, (*c*) setscrews, (*d*) machine screws, (*e*) cap screws.

( ) 100. Heat-treatment of steel means to: (*a*) forge, (*b*) smelt, (*c*) anneal, (*d*) alter its temper, (*e*) harden.

KEY TO TEST

General Metal — Mid-Term Examination

1. *d*	21. *b*	41. *a*	61. *e*	81. *b*
2. *b*	22. *e*	42. *c*	62. *e*	82. *c*
3. *c*	23. *d*	43. *b*	63. *e*	83. *e*
4. *d*	24. *e*	44. *b*	64. *d*	84. *c*
5. *c*	25. *c*	45. *c*	65. *c*	85. *e*
6. *e*	26. *b*	46. *c*	66. *b*	86. *b*
7. *d*	27. *c*	47. *e*	67. *c*	87. *d*
8. *b*	28. *e*	48. *d*	68. *b*	88. *a*
9. *d*	29. *c*	49. *b*	69. *b*	89. *c*
10. *c*	30. *b*	50. *a*	70. *b*	90. *c*
11. *e*	31. *e*	51. *c*	71. *e*	91. *e*
12. *d*	32. *c*	52. *e*	72. *a*	92. *c*
13. *a*	33. *e*	53. *b*	73. *d*	93. *a*
14. *d*	34. *a*	54. *b*	74. *b*	94. *d*
15. *a*	35. *d*	55. *d*	75. *b*	95. *d*
16. *c*	36. *e*	56. *e*	76. *d*	96. *b*
17. *b*	37. *b*	57. *e*	77. *c*	97. *d*
18. *e*	38. *a*	58. *e*	78. *b*	98. *a*
19. *b*	39. *b*	59. *e*	79. *a*	99. *c*
20. *d*	40. *d*	60. *b*	80. *c*	100. *d*

PROBLEMS AND PROJECTS

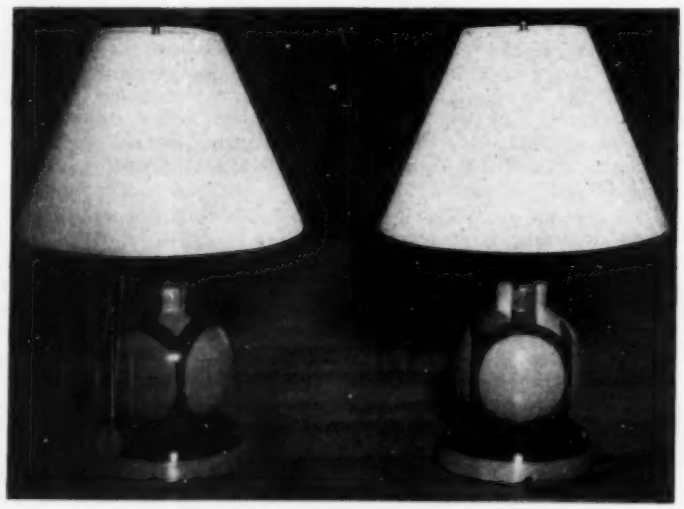
TWIN LAMINATED BED LAMPS

WILLIAM F. WHITE
Springfield, N. J.

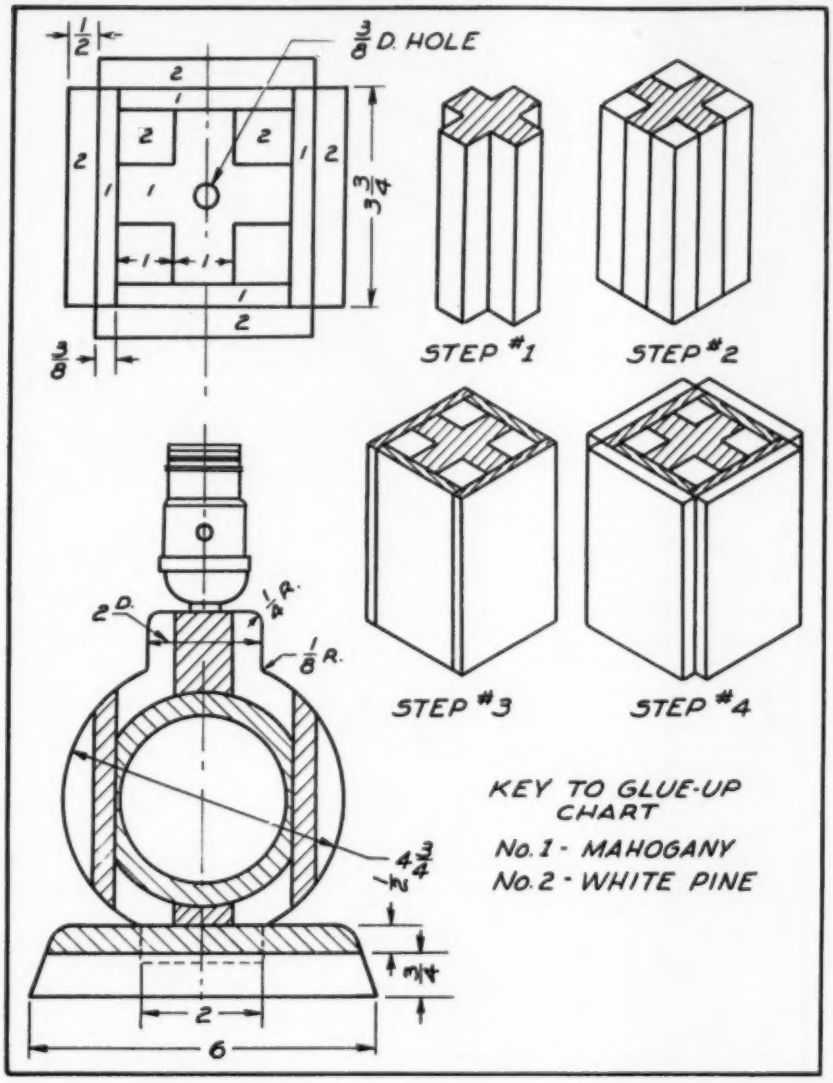
The laminated lamp described herein, besides being an attractive project, gives excellent practice to a beginning machine woodworking student. Construction of this project requires a student to use the circular saw, joiner, and lathe. In addition to the many machine operations he must perform, he also learns the importance of a good gluing, turning, sanding, and French polishing.

The core of mahogany in step 1 is first squared on a joiner. Then the corners are cut out on the circular saw. Another method is to glue three separate strips in the shape shown.

The white pine strips are then cut 1/16 in.



Twin laminated lamps



Twin laminated bed lamps

oversize and glued into the core. After the strips have dried, they are then taken down flush on the joiner.

The ⅜-in. mahogany panels are then glued on, care being taken to have the panels form a tight butt joint.

Over these panels of mahogany, the ½-in. panels of white pine are glued.

When placing the block in the lathe extreme care must be taken to place it exactly on centers to insure the uniform size of the circles.

In turning the lamps, to insure both lamps of being exactly the same size and design, a template was cut out of cardboard and constantly placed against the work to check the shape. The lamp was finished by French polishing it on the lathe.

COFFEE TABLE

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Industrial Education Department
Arkansas A. & M. College
College Heights, Ark.

The coffee table shown in Figure 1 is designed for students or other workers who are capable of attacking advanced cabinetmaking jobs, rather than for a beginner in machine woodwork. This project is a companion piece of furniture for the end table described on page 302, in the September, 1949, issue of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION.

While this table is easy to make, it also involves considerable simple mathematics, consumer knowledge, appreciation of design, finishing, and skill in the use of numerous power machines and hand tools. It also is intended to develop initiative, planned co-ordinated thinking, and co-operation.

Again, as in the end table article just mentioned, it is suggested that two or more work together on one or several of these projects for best results. Co-operation is essential, and the worker should thoroughly plan his work, and study the material list and procedure given before attempting to begin the work of construction.

The tools, supplies, machines, and equipment listed are only those which were actually used in constructing and finishing. Although spindle, belt, and disk sanders, a cutoff saw, band saw, and other machines can be used effectively, they are not absolutely necessary. Several items used could have been omitted without seriously impairing the work. The near minimum was used to show what could be done with a small amount of equipment.

The veneering equipment used was a hydraulic press which would accommodate 36-in. material between uprights. Properly arranged cribbing of 2 by 4 and 4 by 4-in. wood, and 1¼-in. laminated, tempered masonite was used to secure even pressure on all veneer, the masonite being parts of used science lab table tops.

Every part of this project contains irregular curves and care must be taken to produce smooth surfaces throughout. Every sanding device available is welcomed; however, a jig saw was used to cut all curves, a portable and disk sander were used for flat surfaces, and the band saw was rigged with a homemade belt to sand all irregular curves. This device saved considerable time in producing the desired results on surfaces of all pieces and eliminated practically all hand sanding.

Machines and Equipment

Table saw, planer, band saw or jig saw, miter saw, portable sander, drill press, jointer, shaper, veneering equipment, and band saw equipped for sanding. Spray finishing equipment is valuable but not necessary.

Hand Tools

Framing square, try square, ¼-in. twist drill, pilot drills and body drills for 1¼ and 2-in. wood screws, screw drivers, hand scraper, adjustable or socket wrench, brace, and No. 16 auger bit.

Supplies

Mahogany or other suitable wood, plywood (see materials list in Fig. 4), waterproof or other type glue, sandpaper, veneer tape, 1¼ and 2-in. flat or round head wood screws, 4 — ¼ by 2 and 4 — ¼ by 3-in. lag screws or hanger bolts, linseed oil, turpentine, beeswax, polishing wax, and furniture cream. (Other finish supplies if desired — wet-dry finish

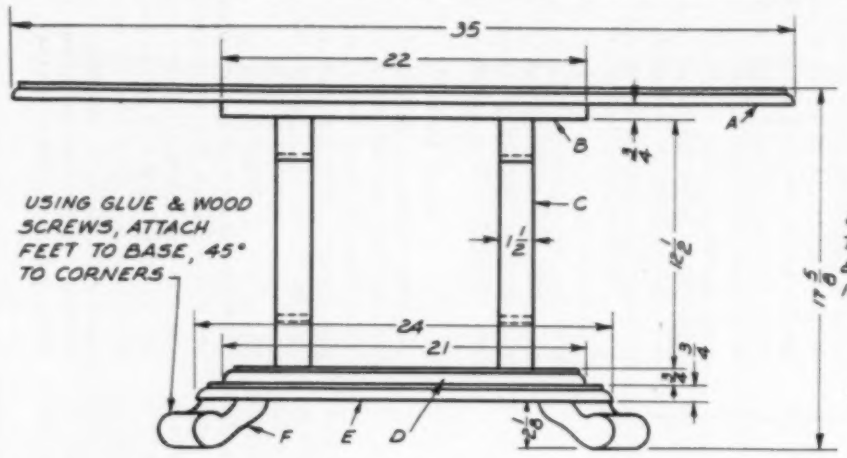
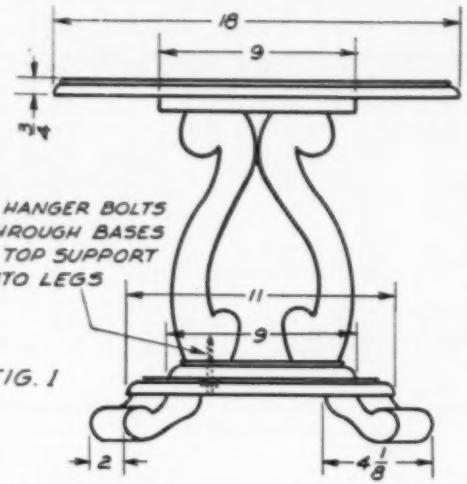


FIG. 1



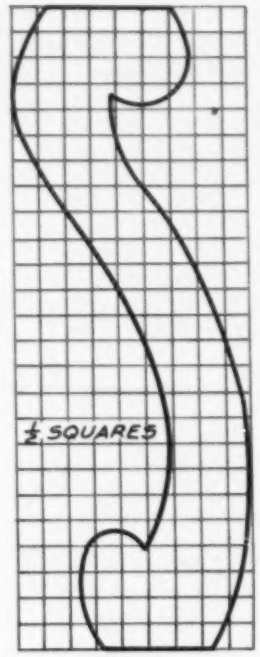
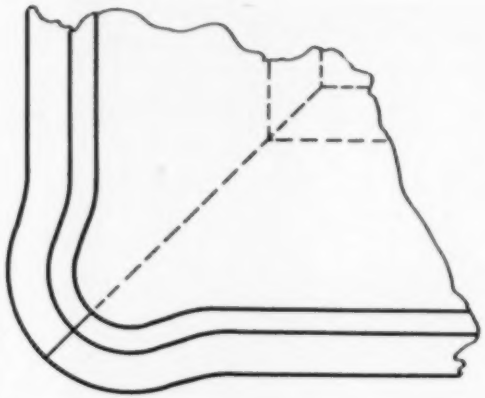


FIG. 2



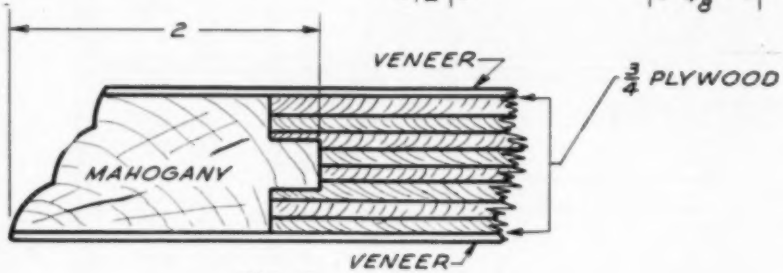


FIG. 5
SECTION OF TOP & BASES WITH VENEER

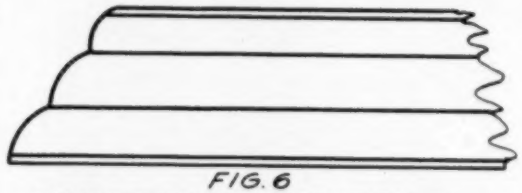


FIG. 6
SUGGESTED CONSTRUCTION & CURVATURE OF TOP & BASES AFTER VENEER IS ADDED

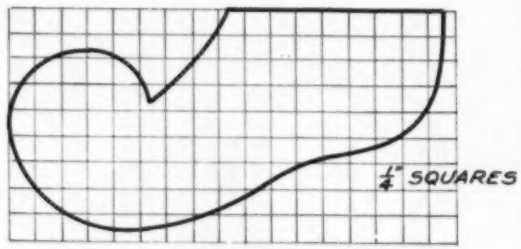


FIG. 3

BILL OF MATERIAL

PART	REQ'D	NAME OF PART	FINISHED SIZE
A	1	TOP	3/4 x 18 x 35
B	1	TOP SUPPORT	3/4 x 9 x 22
C	4	LEGS	1 1/2 x 4 1/2 x 12 1/2
D	1	TOP BASE	3/4 x 9 x 21
E	1	BOTTOM BASE	3/4 x 11 x 24
F	4	FEET	2 x 2 1/8 x 4 1/8
	1	CORE FOR TOP	3/4 x 14 x 31
	1	CORE, TOP BASE	3/4 x 5 x 17
	1	CORE, BOTT. BASE	3/4 x 7 x 20

FIG. 4

Assembly and details of coffee table

paper, stain filler, sealer, varnish, rottenstone, pumice, or others may be used.)

Procedure

1. Make necessary patterns (see Figs. 2 and 3).

2. Select stock to be used for the various thicknesses, widths, and lengths. Join and plane material for edges of cores (see Fig. 5), and glue other materials as necessary for feet and legs.

3. Saw and join ¾-in. plywood cores for the top and two bases to calculated size. The finished size of the various cores will depend upon how much solid border wood is desired to obtain the over-all finished size. See Figure 5 for suggested border size.

4. Saw and join borders around cores to desired size. Suggested size finished, ¾ by 2-in. by the necessary length to obtain the finished size listed in Figure 4.

5. Tongue and groove cores and their borders as shown in Figures 5 and 6. Miter the borders and glue them together.

6. Select plain, quartered, burl, crotch, or matched veneer as desired and veneer the top and two bases. If the borders around cores are not exactly flush with the plywood core, a cut on the planer will prepare those pieces for veneering.

7. Lay out and saw feet and legs, allowing for sanding. See Step 1 or Figures 2 and 3.

8. Lay out design on top and bases, join, and shape as desired. See Figure 6 for suggested design.

9. Sand all surfaces, curved and flat, to finished sizes.

10. Using the proper body and pilot drills, assemble the two bases with wood screws.

11. Locate the legs on the base. Counterbore base and body drill for ¼ by 3-in. hanger bolts or lag screws. Pilot drill legs to receive these hanger bolts and assemble to bases.

12. Cut top support out of ¾-in. plywood, join if desired and center on top of legs. Locate for proper position, counterbore and body drill for ¼ by 2-in. hanger bolts. Pilot drill top of legs for these bolts and assemble.

13. Body drill the feet and pilot drill bases as necessary and attach feet at a 45-degree angle with the corners or center line.

14. Attach top to support with wood screws, use body and pilot drills as necessary.

15. Resand as needed and apply a coat of hot linseed oil. The second and third coats should be a mixture of ½ linseed oil and ½ turpentine in which a small amount of beeswax has been melted and then applied hot. Rub this in thoroughly. A polishing wax should then be applied after which a special furniture cream should be used. Each coat should dry several hours.

NOTE. The common finishes making use of fillers, sealers, and the like also may be used if desired. However, some prefer a natural dull finish, and the linseed oil, turpentine, and beeswax finish produces such results successfully on new and refinished articles.

Precautions

1. Remove all surplus glue immediately after clamping.

2. Always use a double boiler with water in the container near the flame or electric coils, when heating linseed oil and turpentine, or other volatile finishes.

3. Best results cannot be obtained without having sharp tools and cutters, especially shaper cutters.

4. Allow all finishes ample time to dry before attempting to work them or apply other coats.

5. The safest procedure for every job is always the fastest and most economical in the final analysis. Be sure and be safe.

LACQUERED TRAY

DICK HUTCHINSON
San Gabriel, Calif.

To make the lacquered tray pictured here is about as simple a project as anyone could imagine.

To make the frame, lay out on a piece of ¾-in. clear white pine and saw out. The band saw may be used to make the outside cut. The inside, however, will have to be cut out on the jig saw.

Lay out the base for the tray on a piece of 3/16-in. birch plywood. Most of this can be done by tracing around the frame. Lay out the lugs — one on either end — then saw out.

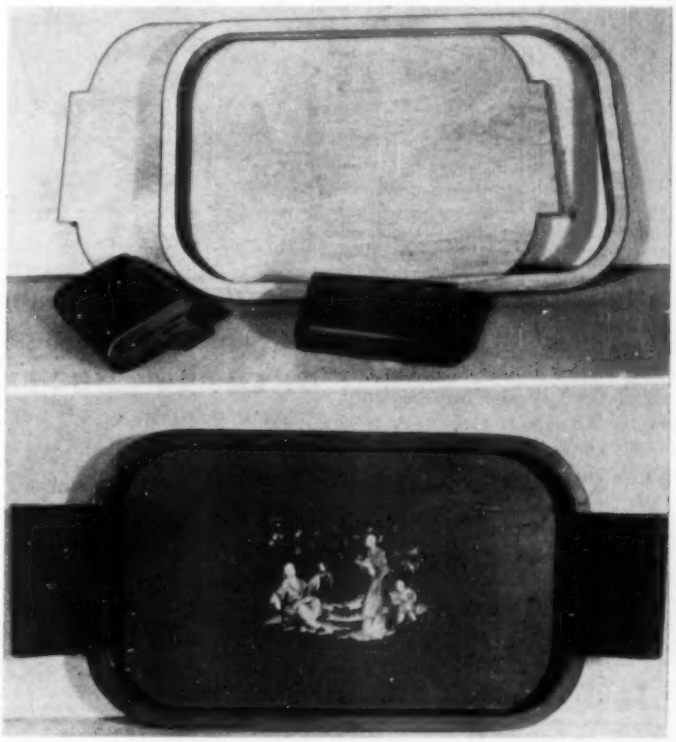
Sand the inside of the frame and then glue and brad it to the base, nailing from the underside. After the glue is dry, sand the outside to a smooth finish.

The two handles may be made of pine, or any softwood. First, a piece 2½ in. square by 10 in. is cut. Then tilt the bench saw to make all of the cuts, proceeding in the order indicated — in the drawing — by numbers from 3 to 8 inclusive. This will result in a roughed out piece long enough for the two handles.

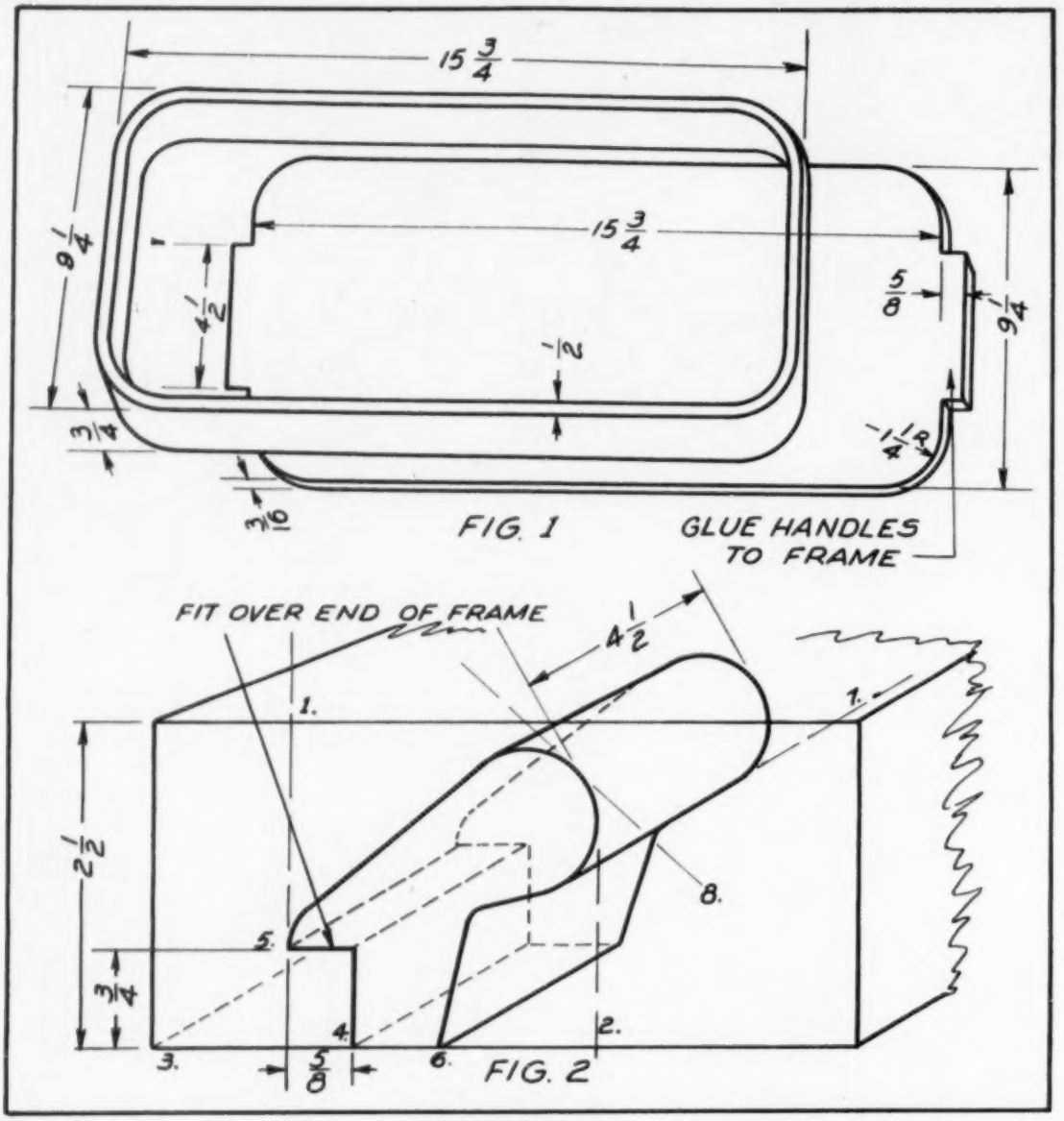
Using coarse sandpaper work the piece into shape as shown. Finish with fine sandpaper, then cut two 4½-in. lengths for the two handles.

The handles are designed so that they will set on the lugs at each end of the tray and lap over the top of the ends of the frame. Glue and brad them in place, and set the brads in and fill the holes with plastic wood. When dry sand all over with fine sandpaper and break the top corners very slightly.

The tray should be given three coats of bright red lacquer, or red enamel if preferred, sanding gently between each coat. The han-



The birch base. The pine frame and the two handles (we used redwood) all finished and ready to assemble



Details of lacquered tray

dles are then given two coats of flat black lacquer or enamel.

The bottom of the tray also may be finished just like the handles. If the tray is to be used on polished furniture it should be covered with felt. The underside also may be coated with thick black enamel, after which black felt flocking should be dusted on. Felt flocking is now available at automotive accessory stores, and at many paint stores.

The flocking should be sifted on evenly, then rolled down into the enamel with a roller, or, if a roller is not available a piece of dowel will do. When thoroughly dry, brush off the surplus flocking with a soft brush.

The centerpiece is a Decal of a Chinese, or Japanese setting, either of which may be found in any paint store, or in a dime store.

CINDERELLA SLIPPERS MADE OF CLEAR ACRYLIC PLASTIC

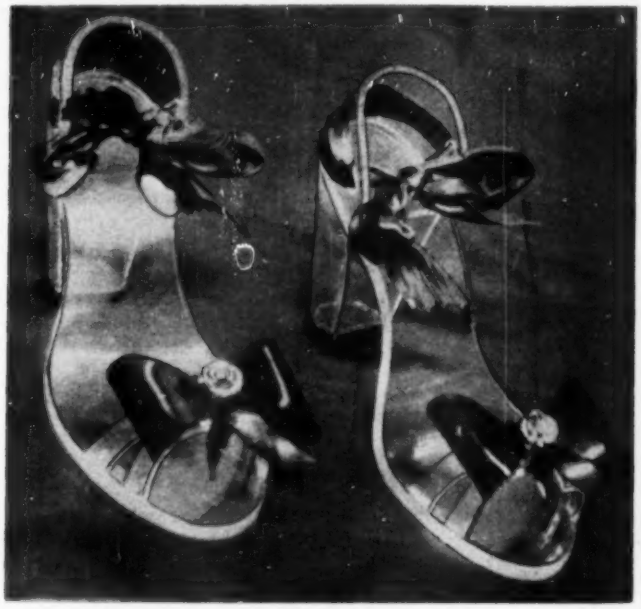
ANDREW R. KOSHER
Penn Street School
Kingston Vocational School
Kingston, Pa.

A few years ago one of our local colleges desired to use a pair of clear plastic slippers, for use at their Cinderella Ball. We designed, developed, and fabricated the slippers at our school, and they have been used annually for some time.

This year one of my high school boys fabricated a pair of plastic slippers with some changes in the original design and entered them in the Industrial Arts Awards Contest sponsored by the Ford Motor Company. This project won an award at the regional contest and was submitted for national judging and was awarded national recognition. The design and workmanship on these plastic slippers offers a challenge and incentive for anyone attempting to fabricate them.

Step-by-Step Procedure for Fabricating Plastic Slippers

1. Lay out soles of slippers, to desired size.
2. Cut out the soles.
3. Polish them.
4. Determine form to which soles should be bent from an old pair of slippers, or make a wooden form for the purpose of giving them the right shape.



Plastic Cinderella slippers

5. Lay out back support of heel.
   a) Cut out back support of slippers.
   b) File as needed.
   c) Polish the parts.
   d) Form the parts to fit the sole.
   e) File and fit as needed.
   f) Cement back support to sole.

6. Lay out front support and decorative trim as desired.
   a) Cut out parts.
   b) File and polish them.
   c) Form the parts.
   d) Cement parts to sole.

7. Lay out parts of heel.
   a) Cut out parts.
   b) File and polish as needed.
   c) Form parts.
   d) Cement parts of heel.
   e) Cement heel to sole.

8. Polish shoes with Simoniz or furniture polish.

9. Install blue ribbon.

BILL OF MATERIALS

No. of pieces	*Name*	*Material*		*Size*
2	Soles	Clear acrylic plastic	.250"	according to size desired
2	Back support	Clear acrylic plastic	.150"	according to size desired
2	Front support	Clear acrylic plastic	.150"	according to size desired
2	Front trim	Blue acrylic plastic	.060"	according to size desired
2	Back of heel	Clear acrylic plastic	.150"	according to size desired
2	Front of heel	Clear acrylic plastic	.060"	according to size desired
2	Bottom heel	Blue acrylic plastic	.250"	according to size desired
2	Ribbons	Blue satin	½ by 12"	

CANAPÉ TRAY

LUDWIG JOHN KASAL
Bronxville, N. Y.

Making trays from discarded playing records is a frugal and enjoyable craft. Experiences in the use of common tools and materials were added to justify its inclusion in an industrial-arts program.

Materials Needed

1. Pan with hot water.
2. Playing record (discarded but not cracked).
3. A 1-in. brush and flat varnish.
4. Flat white paint.
5. Decals.

Materials needed for making the handles will be listed with the directions for each handle.

Directions for Making the Tray

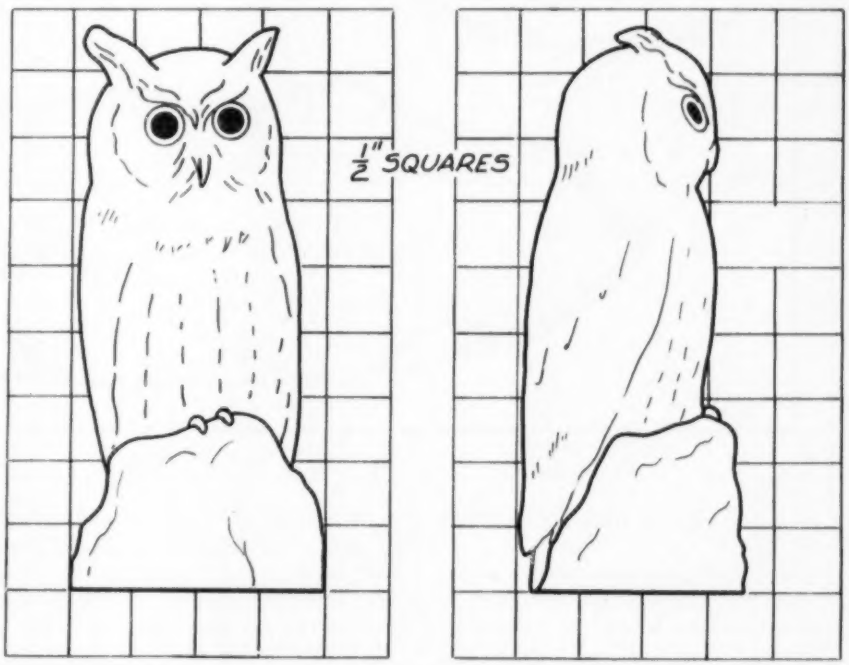
1. Heat water in a pan large enough to take an old playing record.
2. Put an edge of the record into the water; allow to remain until it softens and bend while hot.

CAUTION: Do not bend too sharply and do not exert pressure: experiment with broken record first.

3. Let record dry and paint with flat paint or varnish.

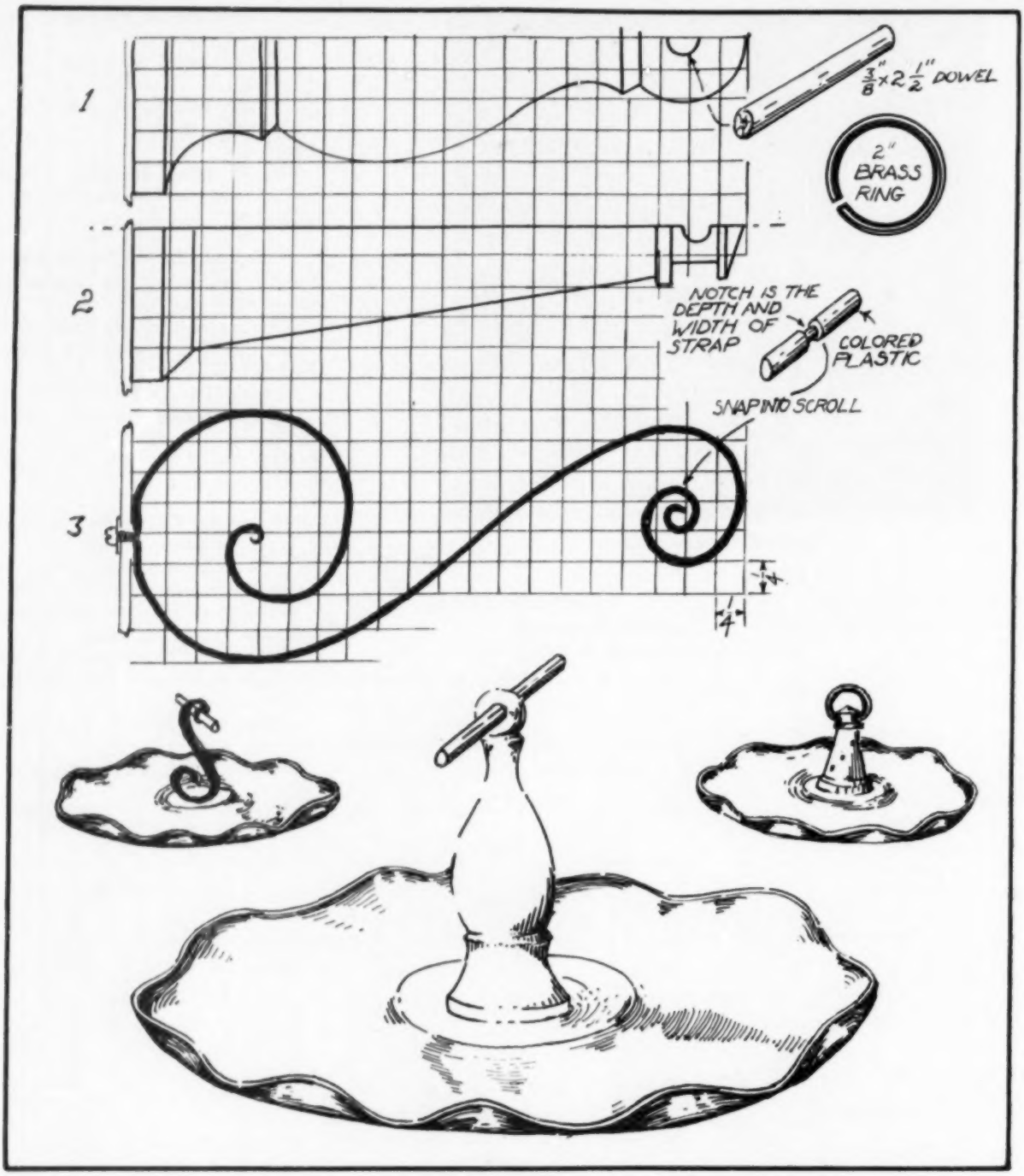
Directions for Making the Two Handles

a) Lay out pattern full size.
b) Cut to required diameters with parting chisel (leave smallest diameter to the end).
c) Turn outside curves with skew chisel and inside curves with gauge.
d) Sand with several grades of abrasive paper and when smooth apply French polish with a cloth patch.
e) Bore a hole for a ⅜ dowel finger grip, or curtain ring.
f) Bore 1 pilot hole for No. 8 by 1-in.



Screetch owl. A whittling job. Finish with artists' oil paints and insert artificial eyes

— James E. Seitz, Huntingdon, Pa.



Canape tray

r.h. machine screw in the bottom of the turned handle.

g) Assemble with washer on the bottom and cover base with felt. Small holes may be bored around the handle to provide for toothpicks.

Metal Scroll Handle

The scroll may be made of ⅛ by ½ plastic, brass, aluminum, or steel.

a) Determine the length of stock needed by bending. Solder along contour of scroll at the bottom.

b) Cut stock to length and texture surface if desired with ball-peen hammer.

c) Heat and bend to shape.

d) Turn groove in plastic rod.

e) Cut and face off rod to proper length.

f) Steel-wool and polish ends of plastic.

g) Drill bottom of scroll and tap for 8-32 machine screw.

h) Fasten scroll to record with ¼ 8-32 r.h. steel machine screw.

i) Cover base with felt.

A speeding violation was a factor in one out of three fatal traffic accidents. — *The National Safety Council.*

TRINKET BOX

CHRIS H. GRONEMAN
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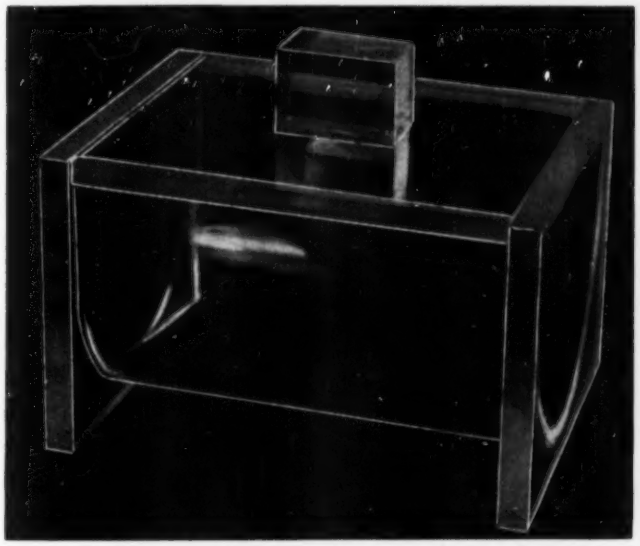
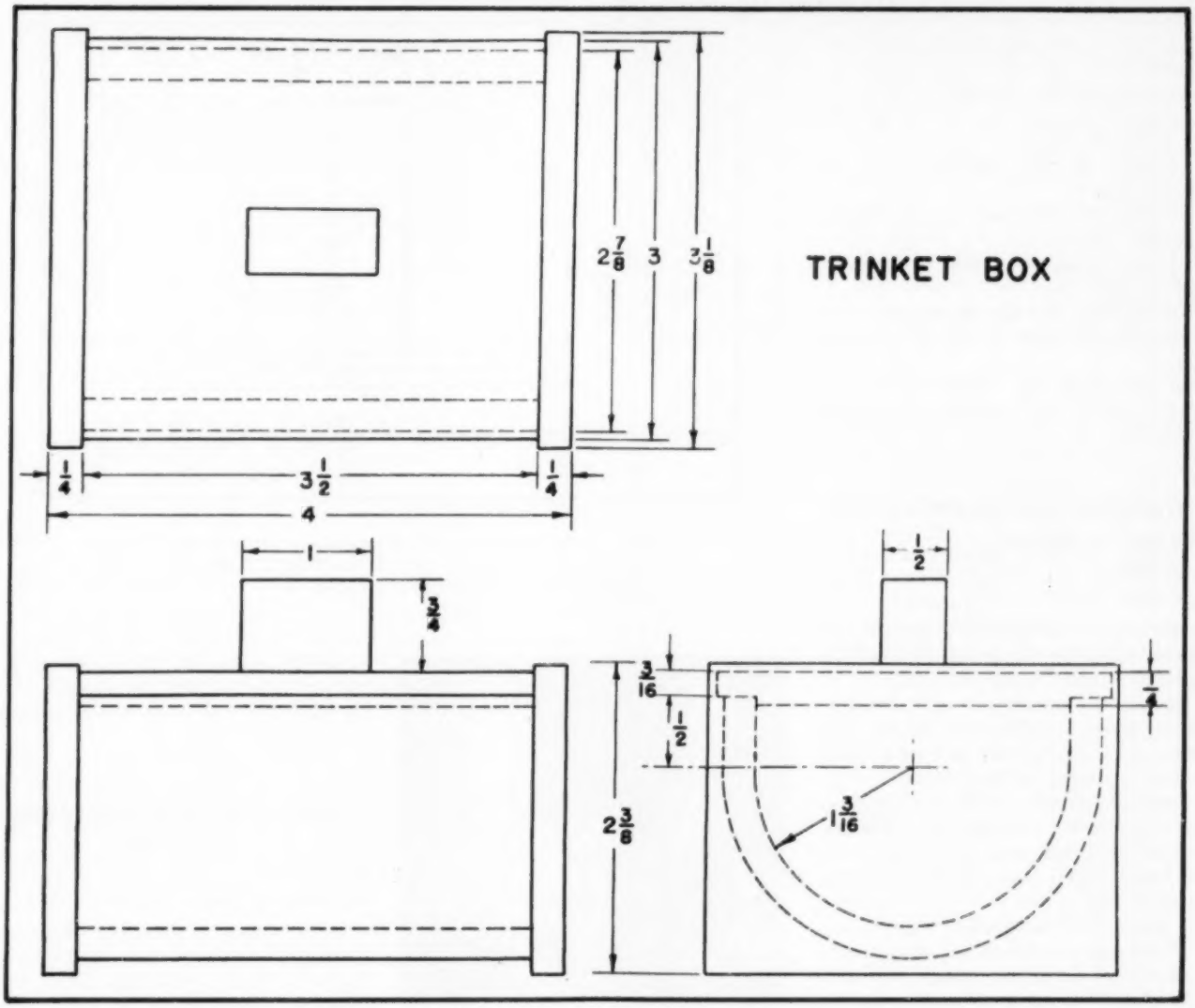
The A & M College of Texas
College Station, Tex.

It is difficult to distinguish between jewel, trinket, and cigarette boxes because they all have the same function, more or less — that of complementing dressing tables, end tables, and vanity arrangements. Boxes vary in the degree of skill required to construct one, but the trinket box described and shown here is a highly pleasing novelty, and one which can be used anywhere.

The curved bottom of this box illustrated requires the forming of a semicircular piece to make the body. This can easily be formed around a turned wooden cylinder or form. The entire fabrication consists of cemented joints. It might be added here that the most



Plastic trinket box



Details of plastic trinket box

satisfactory type joints will be made with the soak-cement process.

This box may be tinted or dyed to match or harmonize or contrast with various color high lights in the room where it is to be used.

It might be decorated with a number of original designs, especially on the ends and top. The craftsman will find pleasure in expressing his artistic taste in working out a satisfying design or pattern.

BILL OF MATERIAL

Quantity	*Material*	*Description*	*Dimension in inches*
1	Plastic	Body	¼ x 3½ x 5⅛
2	Plastic	Ends	¼ x 2⅜ x 3⅛
1	Plastic	Lid	¼ x 3 x 3½
1	Plastic	Handle	½ x ¾ x 1
	Plastic cement		
	Plastic dye		

Procedure

1. Lay out all the pieces on Plexiglas or Lucite.
2. Cut out the pieces with a band or circular saw.
3. Plane and file the edges.
4. Sand the edges.
5. Buff the edges.
6. Heat and bend the body to fit the wooden form.
7. Place the body and ends in position and apply cement.
8. Fit the lid to the box by cutting it with a circular saw.
9. File, sand, and buff the lid edges.
10. Place the handle on the lid and apply cement.
11. Tint if desired.
12. Apply a coat of wax and polish with a soft cloth.

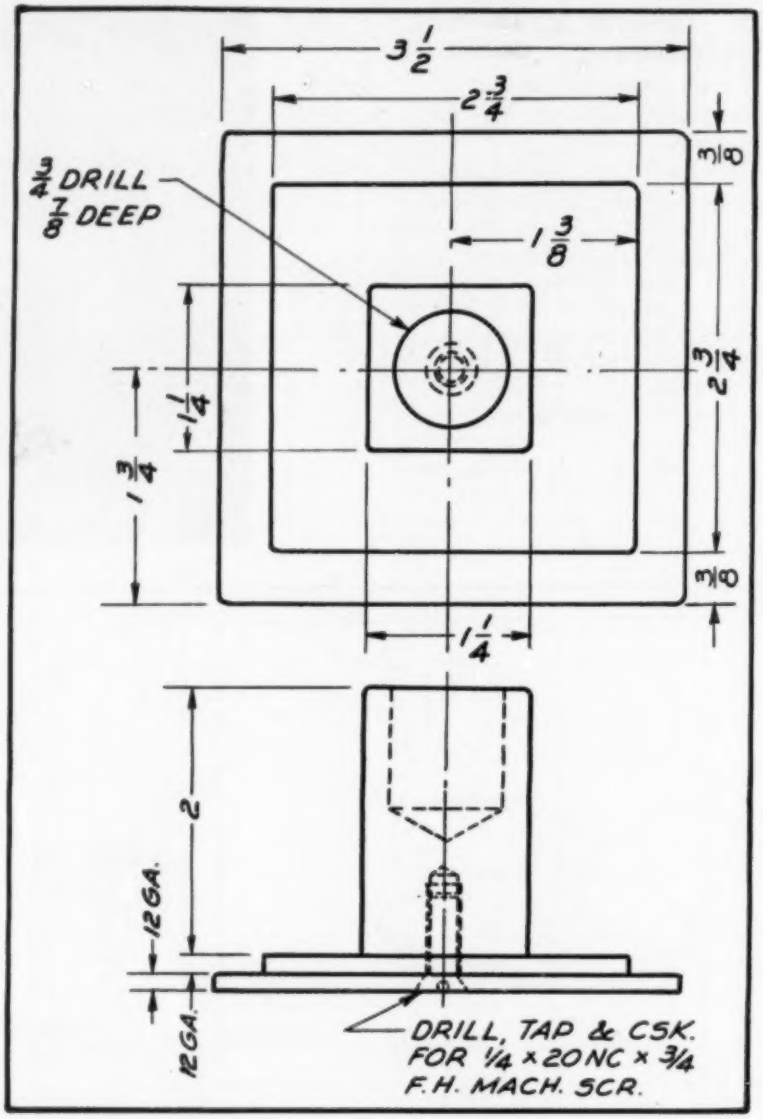
MODERN CANDLEHOLDERS

HERBERT W. YANKEE
High School
Stratford, Conn.

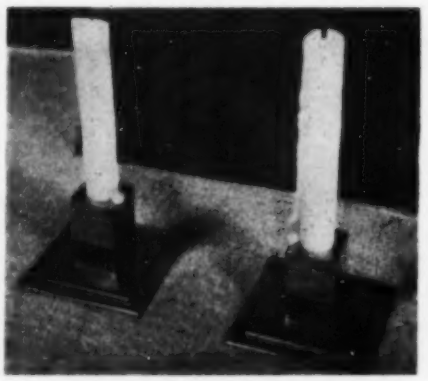
The modern candleholders have been designed for use in the general shop for the students of grades seven and eight.

The learning operations include laying out, cutting, filing, center punching, drilling, counterboring, tap drilling, tapping, hand finishing, assembling, buffing, and polishing.

The two flat pieces which form the bases are made of No. 12 gauge sheet aluminum, and the block which holds the candle is made of 1¼-in. square brass. A ¼-20 flat head machine screw is used to fasten the bases to the block. After the buffing and polishing operations, it is recommended that a spray coat of clear lacquer be applied to preserve the luster. The project is easily within the abilities of grades seven and eight, but offers a challenge to the boys in spite of the simplicity. The project offers an interesting combination of metals that are both workable and attractive.



Modern metal candleholder designed by Herbert W. Yankee, instructor, Technical Arts Department, High School, Stratford, Conn.

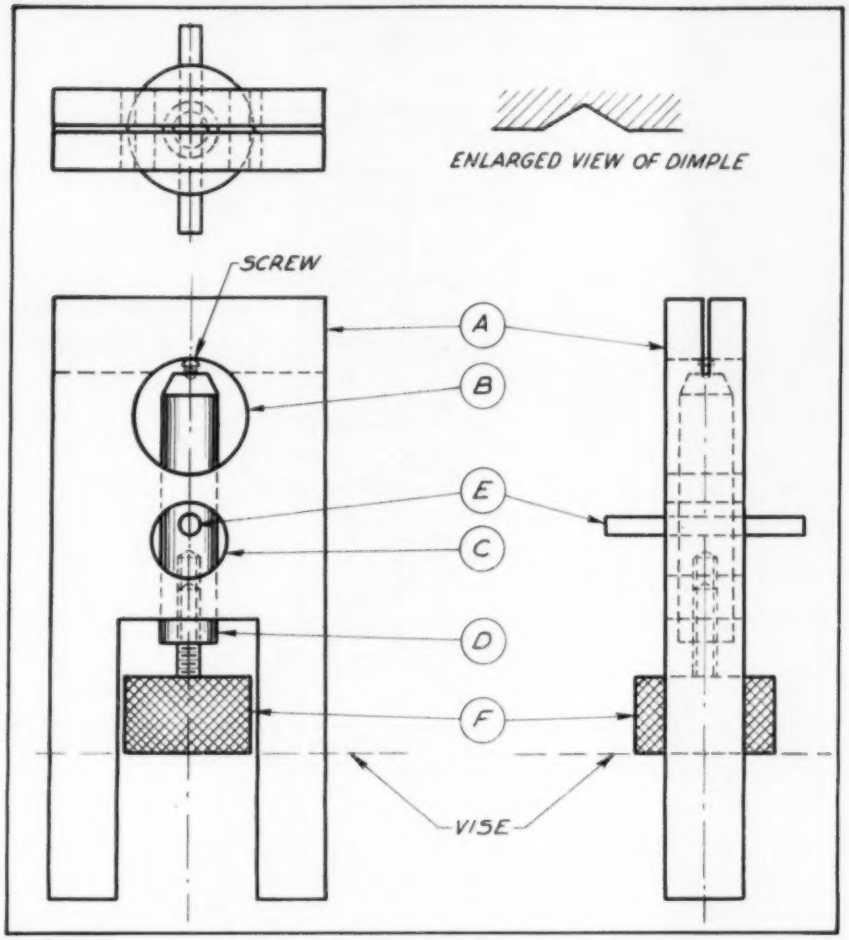


— Photo by Clementi Aseron, Jr.

SHORT SCREW SLOTTING FIXTURE

H. MOORE
Hamilton, Ontario, Canada

A screw slotting fixture different from others because it does not depend on the thread, is a project of interest. It will enable anyone to saw a screw driver slot exactly central and straight in headless screws of any



Short screw slotting fixture

short length and any pitch of thread. These screws are the most difficult to slot as there is not much to grip, and attempts to hold them in the vise usually end in a spoiled thread.

The body *A* is drilled with clearance holes *B* and *C* and lengthwise for pinch rod *D*. A pin *E* in *D* and a knurled screw *F* turning in *D*, with the head cleared by a slot in *A*, and a guide slot in the top completes the work. There is a dimple in *A* and *D*, made with a drill, between which the screws are pinched.

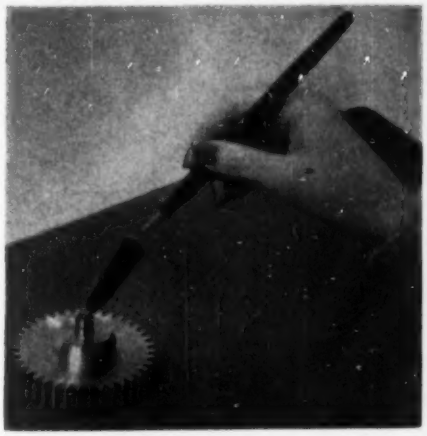
When an odd screw needs slotting put this fixture in the vise with pin *E* resting on the bottom of hole *C*. Then place the screw upright in the dimple in *D* and squeeze up pin *E* to pinch the screw between the two dimples. Hold the pin tightly up while the fixture is dropped in the vise until it rests on *F*. Now tighten the vise and finally tighten the screw by turning *F*. The top of the saw is level with the top of *A* and the depth of cut can be seen as the saw sinks in the slot.

SPUR-GEAR DESK PEN HOLDER

JOHN G. MILLER
Instructor
and
NORMAN GREENBERG
Student
School of Education
Department of Vocational Education
New York University
New York, N. Y.

The pen holder project described herein does not only make a very attractive project for a home or an office, but it also furnishes a degree of motivation for an individual to learn a number of difficult operations in machine-shop practice. Operations such as indexing, counterboring, milling, drilling, reaming, and fitting are included in this interesting project.

The reader, if he so desires, may follow the design suggested in the drawing or he may modify the size and shape to suit his own purpose. The gear described here is known as a *spur gear*. Materials chosen for this project depend upon the supply available. The model shown in the photograph has been made of aluminum with a bronze bushing.



Gear desk pen

The bushing will enable one to fasten a pen-holder swivel to the base. The desk pen, funnel, and swivel were secured at a reasonable cost from a fountain pen manufacturer.

The Gear Blank

1. Cut a disk of aluminum a little larger than 3⅜ in. in diameter. Cast aluminum, zamak, bronze, cast iron, or steel are some materials that may be used.

2. Set the gear blank in a universal chuck for facing and face one side. The amount to be faced will depend upon the thickness of the stock.

3. Face the second side of the gear blank to bring the thickness to the desired size.

4. Without changing the setup of the blank in the chuck, center drill the blank.

5. Drill a ⅜-in. pilot hole through the blank.

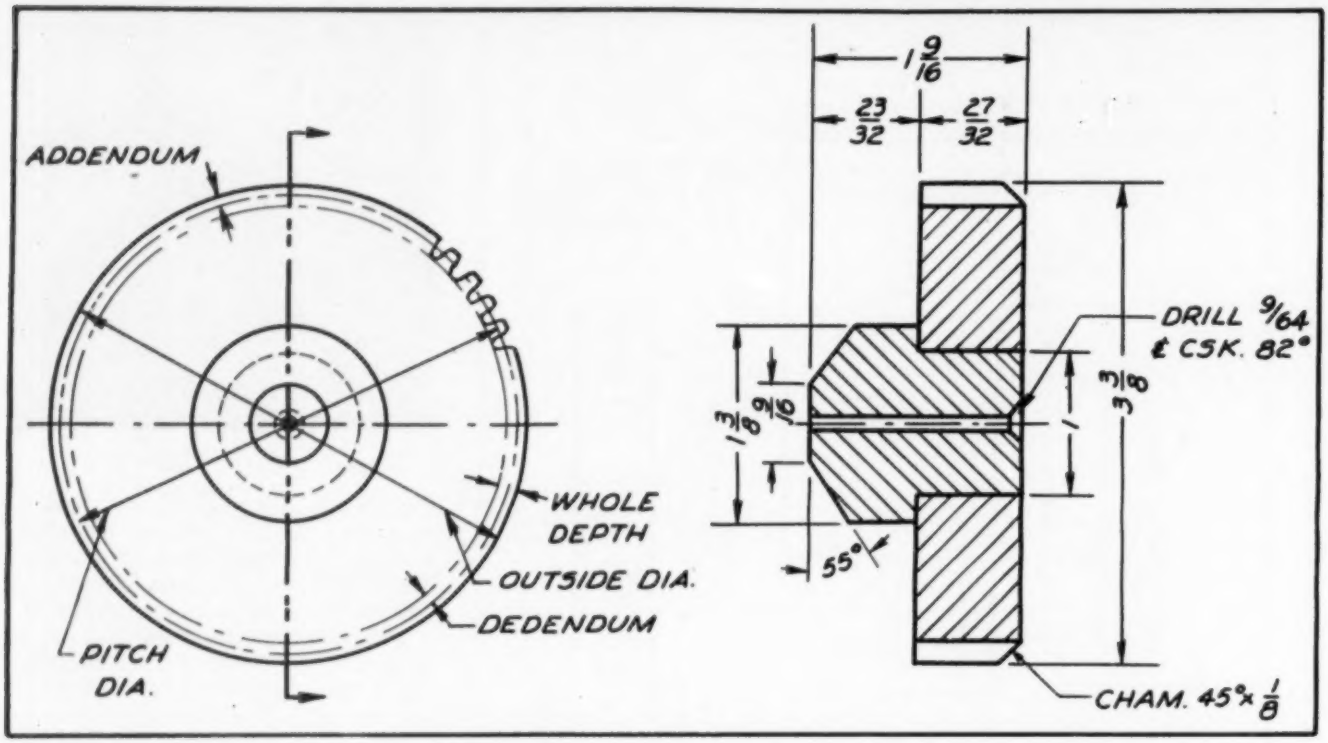
6. Follow drill with a ¾-in. drill.

7. Set up a boring tool in the tool post of the lathe. Bore the hole to a diameter of 0.990 in.; plus or minus 0.003 in. Keep in mind that the boring tool should be properly sharpened, and that its holder should be parallel with the axis of the spindle. Feed the boring tool into the work by hand; take a very light cut, and then with the aid of a telescopic gauge and a micrometer, take a reading of the hole diameter.

8. Set up a 1-in. reamer in the tailstock spindle of the lathe. Feed the reamer into the blank very slowly and carefully. Use plenty of cutting oil throughout this entire operation.

9. Remove the blank from the chuck and press the work onto a 1-in. mandrel.

10. Set up the gear blank in the lathe between centers. Turn the blank to the required outside diameter.



A spur-gear base and bushing for a desk pen

BASIC DIMENSIONS OF GEAR

Diametrical pitch	16
Number of teeth	52
Addendum	.0625
Dedendum	.0725
Whole depth	.1350
Pitch diameter	3.250
Outside diameter	3.375
Bore diameter	1.0000 + .0005 — .0000
Plug diameter	1.0007 + .0005 1.0007 — .0000

11. Select a 16-pitch involute spur-gear cutter, a suitable arbor to fit the cutter, and a dog for the mandrel suitable for the carrier slot of the index head.

12. Set up a milling machine with the arbor and cutter on it, and with the index head and tailstock in position. Check to see whether the index centers are lined up horizontally. Select an index plate which has a circle containing 39 holes. Mount this plate on the index head, and adjust the sector arms so that each turn of the hand crank between the sectors will equal 30 spaces. This number is obtained by dividing 40 by the number of teeth to be cut on the gear blank. Thus $^{40}/_{52} = {}^{10}/_{13}$. Then multiply $^{10}/_{13} \times {}^{3}/_{3} = {}^{30}/_{39}$. The numerator of this fraction gives the number of spaces between sector arms, while the denominator indicates the number of holes on the index plate.

13. Run the table of the milling machine near the column so that rigidity is assured.

14. Adjust the cutter and the index centers so that the center of the cutter lines up with the point on the index centers.

15. Lower the table and arrange the work (gear blank and mandrel) between the index centers. Clamp the tail of the dog in the carrier slot of the index head. Make sure that you *do not* clamp it too tight.

16. Check the whole setup to see whether there will be any interference by the dog, or any other part. *Do not* touch the setup once it has been checked.

17. Run the work under the revolving cutter and raise the worktable until tissue paper is torn between the cutter and the blank.

18. Set the graduated collar on the vertical feed at zero.

19. Run the work from under the cutter and raise the table to position for the full depth of cut, that is, 0.135 in.

20. Run the table toward the cutter until the cutter just touches the work. Set the automatic feed and adjust the feed trips.

21. Index 30 spaces on the 39-hole index plate for the next tooth, and proceed to take the cut on the gear blank. Continue this procedure until the 52 teeth have been cut.

22. Remove the work from the milling machine and set it up again in the lathe between centers. Cut a 45-deg. chamfer on one face of the gear blank.

23. Remove the work from the lathe and press out the mandrel from the blank.

The Bushing

1. Cut off a piece of round stock measuring 1½ in. in diameter and approximately 1¾ in. long.

2. Place this piece in the universal chuck of the lathe, and face one end.

3. Turn down this end of the bushing to a diameter of 1 in., for a distance of $^{27}/_{32}$ in. Since the bushing is to be fastened to the gear with a press fit, the diameter must be made *accurately;* the tolerance is: plus 0.0005, minus .0000.

4. Turn the shoulder perfectly square.

5. Center drill the work.

6. Drill a $^{9}/_{64}$-in. clearance hole for the No. 6-32 machine screw which will hold the pen swivel.

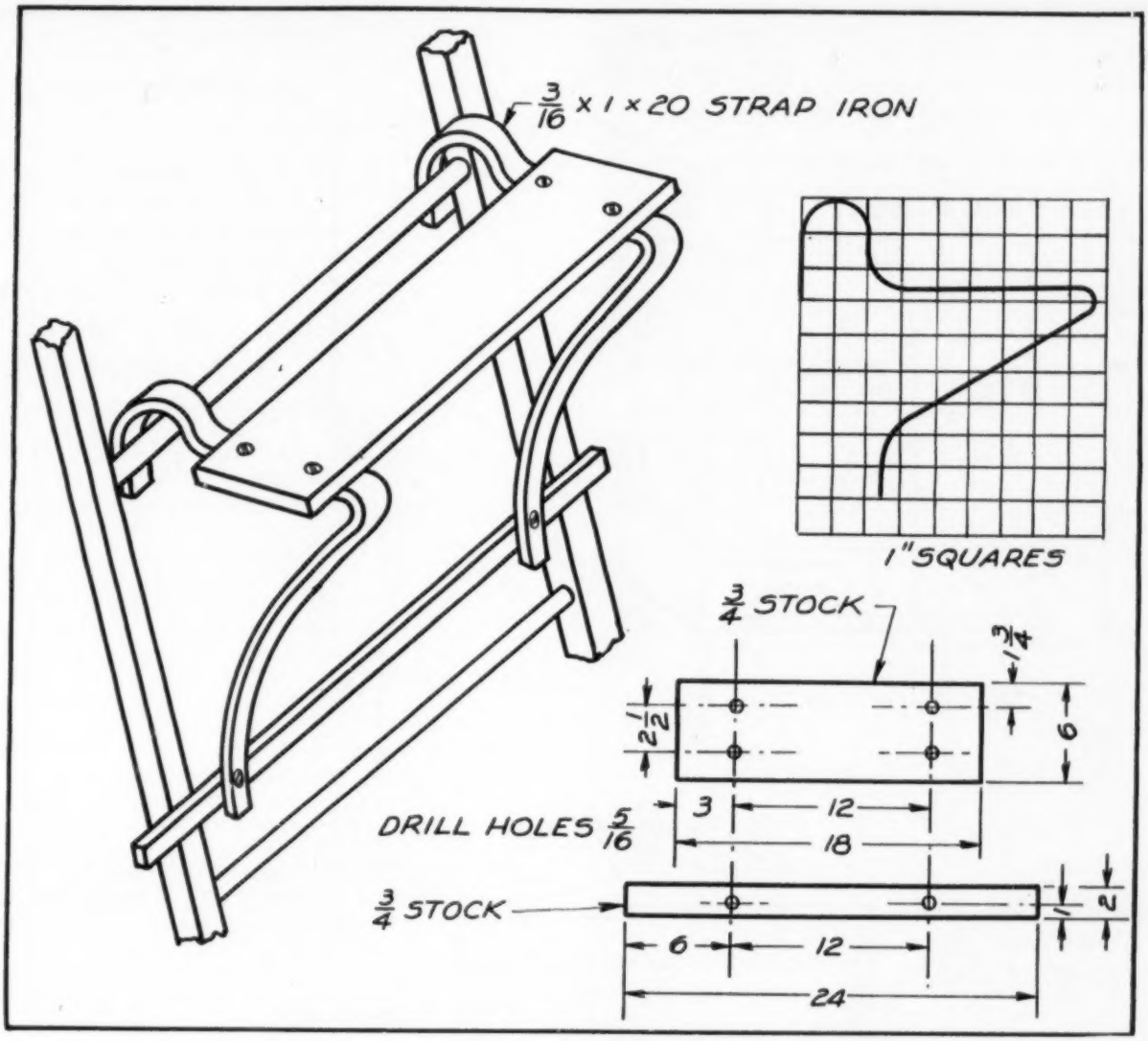
7. Countersink the hole with an 82-deg. countersink.

8. Remove the work from the chuck and wrap a piece of copper around the portion just turned. Replace the work in the chuck with the opposite end exposed for machining.

9. Turn down stock to a diameter of 1⅜ in. This diameter is not critical. You may alter the shape of this projection to suit your own taste.

10. Face the end of the stock so that it measures $^{23}/_{32}$ in. from the shoulder.

11. Chamfer the end as shown.



Details of ladder step

Assembly and Finishing of Project

1. To obtain a very high luster, buff the parts with tripoli and rouge compounds on a buffing wheel.
2. Press the bushing into the base.
3. Obtain a pen-holder set which has a swivel tapped for a No. 6-32 machine screw.
4. Obtain a No. 6-32 flathead machine screw with a length of approximately 1½ in.
5. Fasten the swivel to the base with this screw.
6. Apply a flocking compound to the bottom of gear or cover the bottom with felt.

LADDER STEP

GEORGE BRITTAIN
High School
Johnson City, N. Y.

Here is a dandy project for a general shop. Its usefulness cannot be measured in dollars and cents as it is a boon to all homeowners that use an extension ladder around the house. This ladder step comes in most handy for painting, installing gutters, putting up or taking down screens or storm windows, and the like. The ease with which one can work on this step instead of a ladder rung is amazing.

This project will delight the young craftsman because of its take-home value and use. Dad will be pleased with this aid.

The amount of material necessary for this project is as follows:

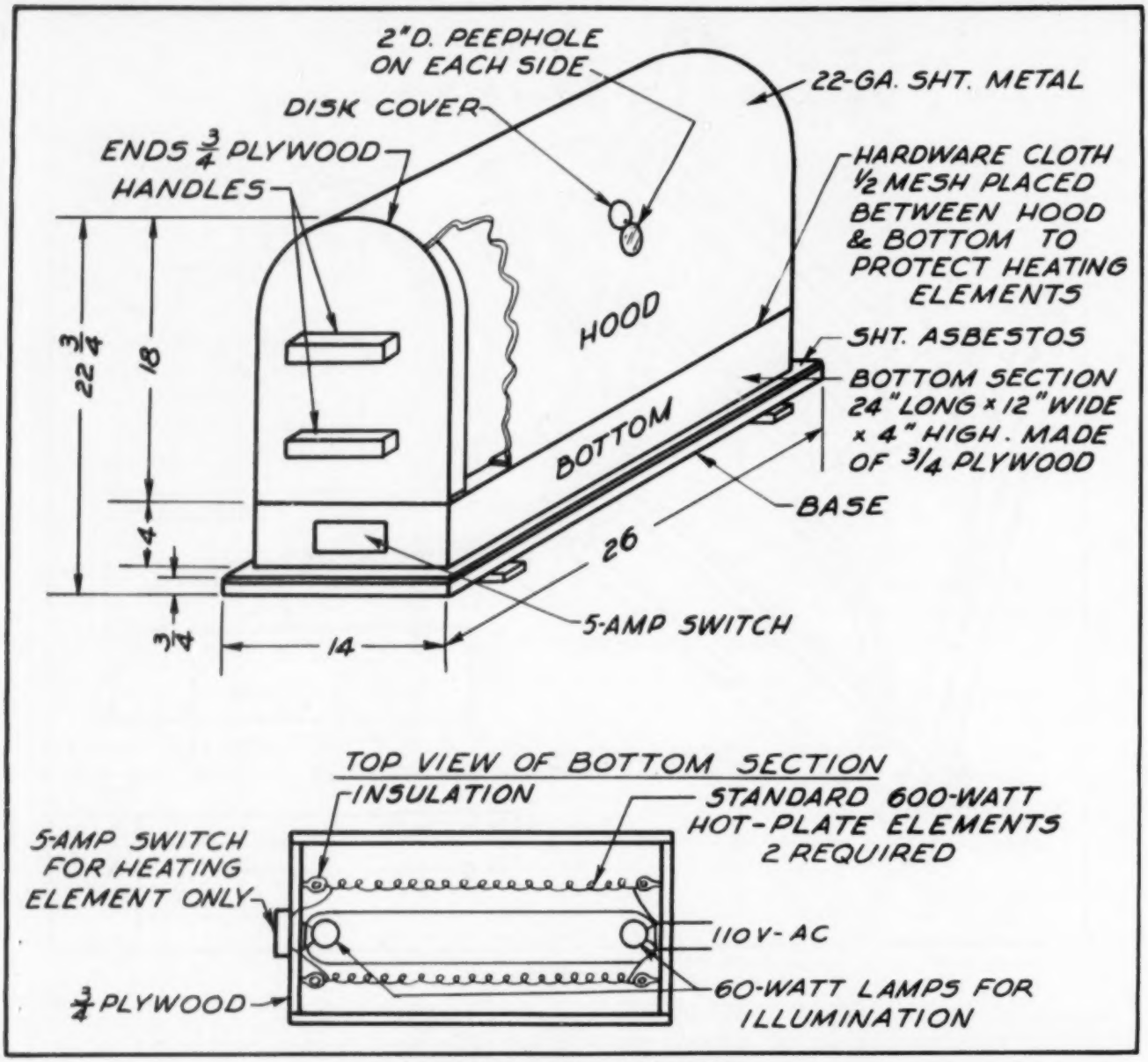
1 pc. ¾ by 6 by 18-in. wood
1 pc. ¾ by 2 by 24-in. wood
2 pcs. strap iron 3/16 by 1 by 20 in.
Six 5/16-in. carriage bolts

The assembly is very simple. Riveting the end of the bolt is a good safety factor. This project is not cumbersome in handling while on a ladder, and it is not hard to step up or down from one rung to the other when it doesn't have to be moved.

PORTABLE OVEN FOR WRINKLE FINISHES

M. D. ROBERTS
Assistant Professor, Manufacturing Processes
and
W. O. SATTERLEY
Assistant Professor of Engineering Drawing
Purdue University
Lafayette, Ind.

For the general shop which finds it inconvenient to install a large permanent type oven for drying and baking paint finishes, this portable type will be quite adequate. It does a job which is as good as that achieved



A portable oven for wrinkle finishes

Oven set up for use. Lower part of oven showing heating section

by the more complicated types of ovens, it is simple to build, and requires very little space for storage when not in use. The base and end sections are constructed of plywood. A sheet of galvanized metal is cut to size, a 2-in. inspection hole covered with a swinging plate is cut on each side, and the metal formed around the plywood and fastened into place with nails or screws. A ½-inch 90-deg. bend inward on each side of the bottom portion of the cover will strengthen it. Handles or blocks on each end for lifting will also be convenient.

The lower section resembles a box with an open top. It is made of plywood lined with asbestos. A porcelain light socket is mounted at each end for illumination. Two 600-watt Nichrome hot-plate elements are stretched between ceramic insulators in the lower section, connected in series and attached to a line cord through an on-off switch. A shelf can be made of hardware netting or steel rods across this section. The object may also be hung on an upright of some kind. In any event it must be placed in such a manner that the metal cover can be placed or removed at will without touching or disturbing the painted article.

Since no thermostatic control is indicated on this type of oven the problem of heat control arises. Working in a normally heated room, the 300-watt element will keep the oven at about the right heat. As a check, however, a temperature which will barely permit the bare palm to be held against the top of the metal canopy will be quite satisfactory. If the temperature rises above this the current may be switched off for a few minutes, then on again. After the desired wrinkle texture has been obtained, the oven may be turned off and further drying and curing continued at room temperature.

By opening the inspection covers the operator can watch the progress of the wrinkling process. For this reason the inside of the oven should be well illuminated. This oven is inexpensive, and easily built, and it will be very satisfactory for intermittent use.

INDUSTRIAL ARTS AND THE FUTURE

SHRIVER L. COOVER
Chairman, Industrial-Arts Policy and Planning Committee

The industrial-arts policy and planning committee lived up to its name at the Boston Convention of the AVA and did some very important planning for the coming year.

One major objective is to be the publication of a "Handbook on School Shop Planning for Teachers, Architects, and School Administrators." William Mason of Cleveland, Ohio, is the chairman of the steering Committee for this publication. The other members are: James Hammond, Fitchburg, Mass., Wesley Ketcham, Hartford, Conn., and John Hurley, New York City. Approximately fifty more teachers will be asked to serve on this committee.

A second objective is to obtain young people with ability and professional promise as future teachers of industrial arts. It has been conservatively estimated that the number of industrial-arts positions will double in the next ten years and at the present time there are not enough properly certified teachers to fill existing positions in a single one of our 48 states.

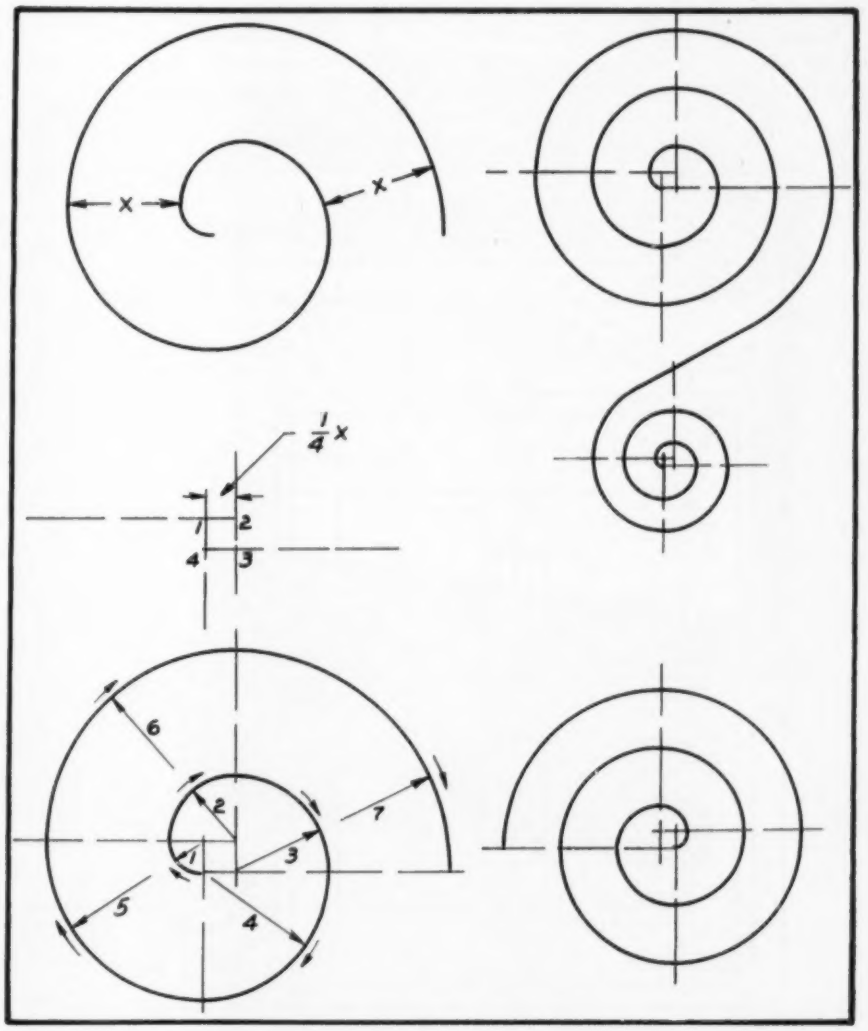
Lynne Monroe of Santa Barbara, Calif., was appointed chairman of a "Committee on Recruitment." He will select a score or more teachers to work with him on this important problem. The tentative plan is to publish pertinent materials written by this committee in the INDUSTRIAL ARTS AND VOCATIONAL EDUCATION magazine as editorial space will allow.

Chris Groneman of Texas A. & M., and chairman of the AVA Bulletin Revision Committee on "Improving Instruction in Industrial Arts," held several meetings of his committee. Excellent progress was made. He expects to have the entire bulletin in final form by July and to have it printed by the time of the next AVA Convention.

Since the 25,000 copies of "The Place and Purpose of Industrial Arts in Education" which was a project of the IAPPC have been distributed and since the requests for more copies are coming in daily it was agreed that 20,000 more be printed immediately.

It was also agreed that any educational group could reprint this bulletin by writing to Roy Fales, Albany, N. Y., and by giving proper credit.

Another important item dealt with the or-



How to draw spirals with a compass

—Geo. A. Willoughby, professor and department head, Michigan Normal College, Ypsilanti, Mich.

ganization of the industrial-arts division of the AVA and the policy and planning committee itself. Work on constitutions for both of these organizations has been in progress for several years. The committee decided to join both under a single constitution and appointed a committee to draw up a constitution to be presented for adoption of the 1953 AVA Convention. This committee consists of G. Harold Silvius, Detroit, Mich., Ivan Hostetler, Raleigh, N. C., and G. Wesley Ketcham, Hartford, Conn., chairman.

KITCHEN TOWEL RACK

E. R. GLAZENER
Industrial Education Department
Arkansas A. & M. College
College Heights, Ark.

The towel rack shown has been popular with all age groups in the secondary school as a beginning project in hand tool woodwork. It has been particularly successful for use in the junior high school when used as a regular or supplementary drawing assignment, and also as a project that is to be followed up by constructing it in the shop. Although simple in design and construction, it requires considerable layout and accuracy in construction.

The piece, 1⅝ by 3¾ by 4¾ can be cut from standard 2-in. pine or made from other material and planed to proper thickness. In its construction, the pupil will learn several skills in tool operation, some finishing, and how to be economical with materials.

MATERIALS AND SUPPLIES

No. of Pcs.	*Name*	*Size*
1	Wood	1⅝ x 3¾ x 4¾
1	Dowel	½ x 36 in. long
1	Dowel	¼ x 4½ in. long

No. 1 and 2/0 sandpaper, spar or bakelite varnish if finished natural, or enamel if painted.

Tools and Equipment

Crosscut and ripsaws, backsaw, brace and No. 4 auger bit, coping saw, hand drill and ¼-in. twist drill, plane, wood chisel, mallet, rule, try square, combination square or marking gauge, and hand scraper.

Procedure

1. Secure material for back, saw to approximate size, and plane to finished size.

2. Lay out 2¾ by 3¼-in. rectangular hole with try square and pencil, and bore a hole near one corner of this rectangle in the scrap with a No. 4 auger bit.

3. Lay out and cut ⅛-in. chamfer.

4. Using the coping saw, saw the rectangular opening, allowing for chiseling to finished size.

5. Using the chisel and mallet, cut the opening to finished size.

6. Secure a ¼ by 4½-in. dowel for the center pin and a ½ by 36-in. dowel and lay out the swinging towel holders 10, 11, and 12-in. long. To obviate the possibility of splitting, lay out the ¼-in. hole in each of these holders and drill with the hand drill and ¼-in. twist drill, then cut each separately and round the end opposite the hole.

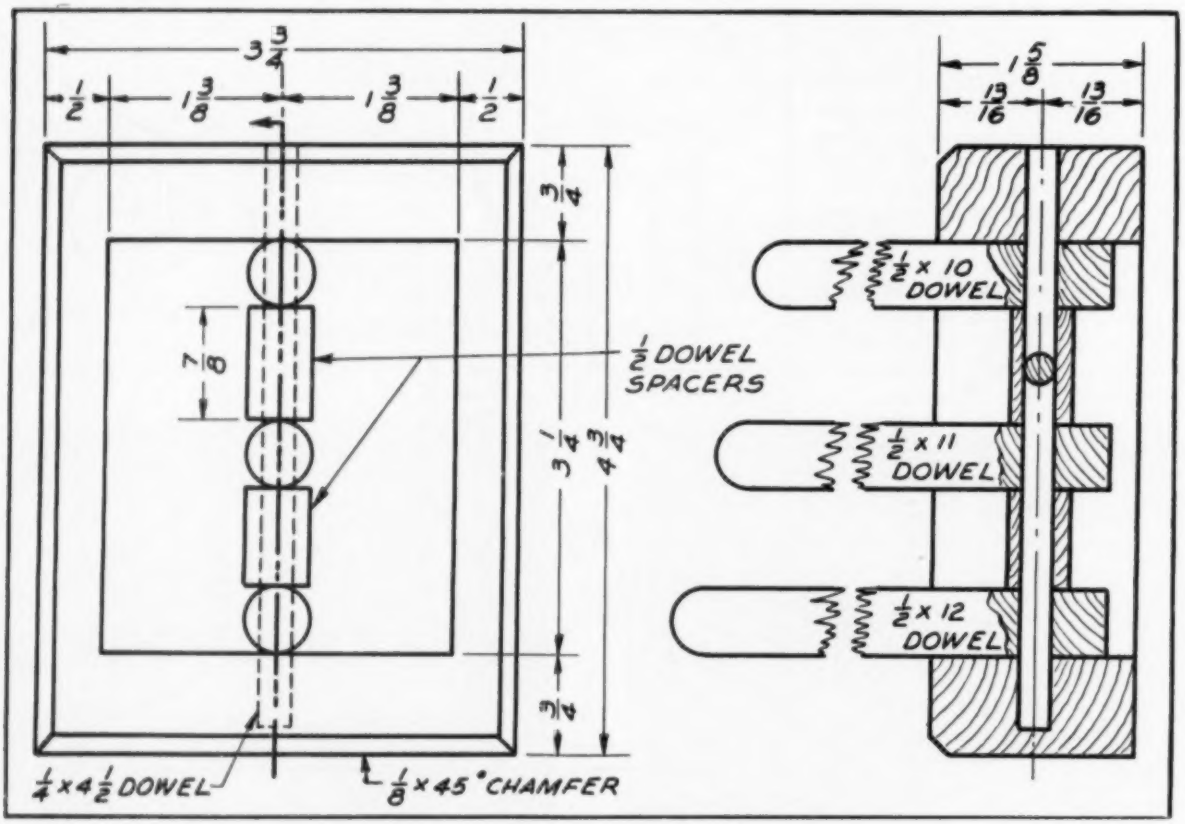
7. Cut the two spacers, allowing for sanding, and drill the hole through them with the ¼-in. twist drill.

8. Lay out and bore the ¼-in. hole to proper depth to receive the ¼ by 4½-in. dowel or center pin.

9. Scrape and sand all parts to finished size.

10. Assemble and finish as desired. Apply a sealer and then use spar or bakelite varnish as a finish. This type varnish will resist peeling and discoloring when subjected to moisture.

NOTE: Following Step 9 or 10, it may be desirable to drill holes in the back of the body to mount the rack on the wall.



Kitchen towel rack

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ASSOCIATION NEWS

(Continued from page 8A)

cation, Baltimore, Md. As this was his 26th re-election as treasurer, his co-workers presented him with a gift.

Executive secretary, Dr. M. D. Mobley, former Georgia state director of vocational education.

At the Ship's program held Friday afternoon, Clyde C. Clack, of Binney & Smith Co., New York, N. Y., the Ship's Captain; Kenyon S. Fletcher, D. C. Heath & Co., Boston, Mass., chairman of the citation committee; and Harry E. Masters, The L. S. Starrett Co., Athol, Mass., deck officer were introduced by Dr. M. D. Mobley.

The recipient of the Ship's citation was Professor E. E. Ericson, State University, Santa Barbara, Calif.

The usual large number of presents were distributed by the members of the crew.

The next AVA convention will be held at Chicago, Ill.

1952–1953 KANSAS VOCATIONAL ASSOCIATION OFFICERS

President — Kenneth Henderson, instructor of vocational agriculture, Garden City.

Vice-presidents representing:

Homemaking — Miss Elizabeth Hirschler, chairman, Vocational Homemaking Teachers, High School, Dodge City.

Part-time Occupational Education — Max Stalcup, president, Co-ordinator-Instructors Association, High School, Lawrence.

Industrial Education — H. A. Starkey, president, Kansas Industrial Education Association, and industrial-arts instructor, High School, Great Bend.

Agriculture — Charles O. Carter, president, Vocational Agriculture Association, High School, Chanute.

Secretary-treasurer — F. E. Carpenter, vocational agriculture instructor, Highland Park Rural High School, Topeka.

1952–1953 KANSAS INDUSTRIAL EDUCATION ASSOCIATION OFFICERS

President — H. A. Starkey, industrial-arts instructor, High School, Great Bend.

Vice-president — Leonard Selig, industrial-arts instructor, Augusta.

Secretary-treasurer — Donald W. Lake, industrial-arts instructor, Junior High School, Coffeyville.

THE PENNSYLVANIA INDUSTRIAL ARTS ASSOCIATION ALLEGHENY COUNTY BRANCH

Three professional discussion meetings were held during September, October, and November.

On Wednesday, December 17, 1952, the members participated in a tour of the Continental Can Plant in West Mifflin Borough.

The next meeting will be held on January 28, 1953, when the members will be guests of R. C. Stucker, general manager of Hardwood Corporation of America at a dinner. — *Ralph Steab*

MU SIGMA PI INITIATION NIGHT AT WAYNE UNIVERSITY

This year's initiation meeting was held on Friday, December 5, 1952. The initiation ceremonies were conducted by Charles Sechrest at the Wayne University Student Center.

CHICAGO METROPOLITAN ROUND TABLE MEETS AT GREER SHOP TRAINING, INC.

The Chicago Metropolitan Round Table held an evening meeting at Greer Shop Training, Inc., 2230 So. Michigan Ave., Chicago, Ill., on November 14, 1952.

After a free buffet dinner, courtesy of Edwin Greer, president and founder of the Greer School, Enrique Bravo, Consul of Mexico, spoke on the subject, "General Glimpses of Shop Training Round the World."

This address was followed by a trip of the Greer School, a 50-year-old practical trade school.

ONE-DAY PROGRAM HELD AT NEWARK, N. J.

The State Teachers College at Newark, N. J., in co-operation with the Industrial Arts Guild of the College, and the American Industrial Arts Association, held a one-day program on October 30, at the College.

A welcoming address was made by C. E. Frankson, chairman of the department of industrial arts; and a greeting was given by Dr. Eugene G. Wilkins, president of the College. John Adams, president of the Industrial Arts Guild at the College, extended a greeting.

Dr. Gordon O. Wilber, president, American Industrial Arts Association, discussed "Industrial Arts Developments on the National Level."

John A. McCarthy, assistant commissioner of Education, Trenton, presented the topic "Industrial Arts Developments on the State Level."

Dr. Kenneth Brown, assistant director of fine and industrial arts, Philadelphia, Pa., spoke on "Industrial Arts Developments on the City Level." — *Carl E. Frankson.*

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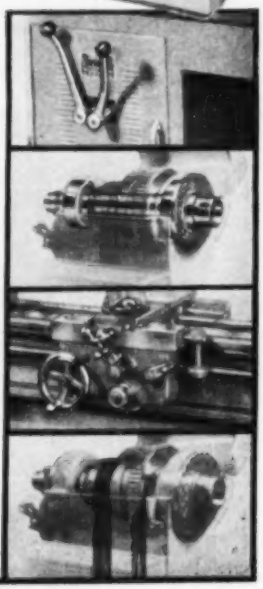
. . . Timken "Zero-Precision" Tapered Roller Spindle Bearings (the absolute in accuracy) permit student work to ten-thousandths of an inch, and hold this accuracy without constant maintenance.

★ SHELDON CONTROLS
SHELDON-taught students are ready to operate standard industrial lathes—are familiar with standard controls and the "big lathe feel".

★ SHELDON CAPACITY
The extra swing and greater collet capacity increase the range of possible student projects—from the "playing store" group to the practical. The extra power to the spindle, the speed range, weight and strength of SHELDON Precision Lathes permit heavy cuts, spinning and demonstration of correct use of new cast-alloy and carbide-tipped cutters.



Built by modern methods, with the finest machine-tool special machinery, on a continuous production line basis, these better lathes cost little more than ordinary school type lathes. *Write for Catalog*

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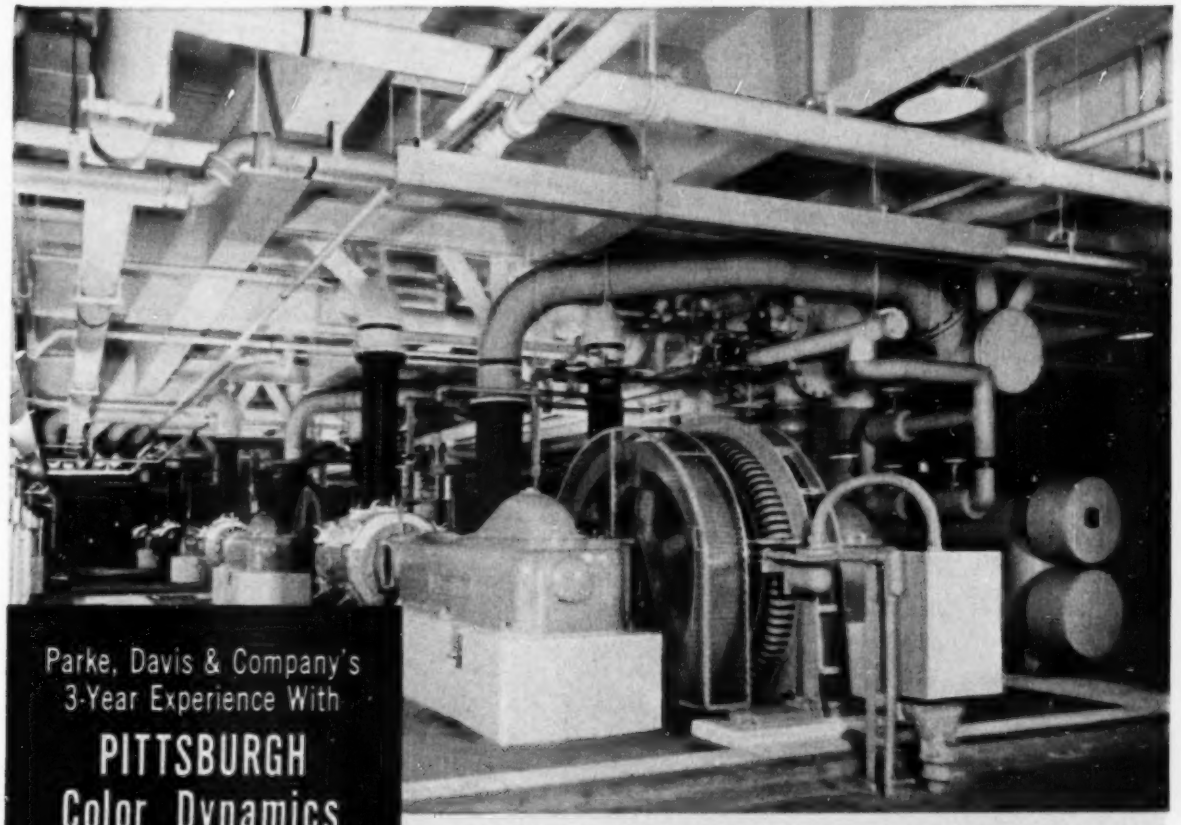

That's why the skilled shopmen of tomorrow must know how to put color to work to improve production and morale of workers.

MANY modern educators recognize that better knowledge of the use of color is making an important contribution to the improvement of production techniques and adding to the health and welfare of workers.

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● **COLOR DYNAMICS** is an up-to-date painting system based upon the simple reactions of human beings to color. Tests have proved that some colors stimulate and inspire, others rest and relax, still others fatigue, depress and irritate.

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● For a practical demonstration of the benefits of COLOR DYNAMICS, paint the walls, ceilings and machines of your manual training rooms according to this system and see the difference it makes. Should you desire a color engineering study of these rooms—we'll be glad to make it *free* and without obligation. Call the Pittsburgh Plate Glass Company branch nearest you and arrange to have a color expert see you at your convenience. Or send this coupon.

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Supplied with round or special-shape center hole for portable electric hand-saw machines.

Simonds, sawmakers for woodworkers since 1832, now offers this complete new line of high quality saws at new popular prices ... 13 types of blades up to 12" diameter (including Dado Heads and Carbide-Tipped Saws) . . . all made of Simonds Steel and fully guaranteed. Get them at your hardware dealer or local saw shop.

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Personal News

CHARLES B. LAMB RETIRES

Professor Charles B. Lamb of the industrial-arts department of Southeast Missouri State College, Cape Girardeau, Mo., has completed his fiftieth year of association with this institution. With the exception of a brief period following World War I, Professor Lamb has been engaged in the professional training of industrial-arts teachers for a half century.

In the fall of 1901 Mr. Lamb came to the Cape Girardeau Normal School to establish a manual training department, specializing in the areas of mechanical drawing, woodworking, and forging. During summer intervals he supplemented his professional background with further study at Iowa State College of Agriculture and Mechanic Arts, Bradley Polytechnic Institute, Cornell University, and the University of Missouri.

In less than five years after opening the department, Mr. Lamb was forced to build again from the ground level, when the old Normal building was razed by fire. Only a few woodworking tools and benches were saved. When the new manual arts building was completed in 1906, Mr. Lamb was promised a special appropriation to completely equip a new, first class department. Finally, he received half of the original amount and installed the latest modern line of machinery then available, consisting mainly of heavy woodworking machines driven off a central line shaft. The metal shop included a battery of downdraft forges and supplementary sheet-metal and bench equipment.

Mr. Lamb's career spanned the interval between manual training with its emphasis on exercises in joinery, and the later Sloyd system of project development, which in turn was followed by a period of expanded manual-arts offerings and finally, the multi-area industrial-arts concept of the present day.

Mr. Lamb's family of four daughters and one son are active in their professions. His son chose a vocation nearest to the specialty of his father by completing the master's degree in architecture at Yale University. The many friends and associates of Mr. Lamb were saddened by the death of his wife the past December. We are certain that former students will take the opportunity to express to him their appreciation for their association in his classes.

At the close of the recent summer term, Mr. Lamb formally retired from teaching architectural drafting. On the occasion of a faculty picnic a handsome leather traveling bag was presented to him in recognition of his life on the campus. He was also the recipient of an honor banquet scheduled during the home-coming week end in October, at which time he addressed the industrial-education section of the Southeast Missouri Teachers Association, in session on the campus.

♦ Dr. Lewis Wilbur Smith, former Berkeley Superintendent of Schools, and an authority on vocational education, died at the age of 76, on December 19, 1952, at Berkeley, Calif.

Consultant to the President's Advisory Commission on Vocational Education in 1937, Dr. Smith also was a past president of the Illinois Principals' Association.

He received a bachelor's degree from Denison University, which also awarded him an honorary doctor of laws degree in 1928. He received his master's and Ph.D. degrees from the University of Chicago.

Before coming to Berkeley, Dr. Smith was superintendent of the Joliet, Ill., high schools and junior colleges. He served as superintendent of schools here from 1928 to 1936.

Survivors include his widow and two sons, Harold W. Smith, and Lewis W. Smith, Jr.

♦ Stanley D. Thomas, vocational instructor at Ely, Nev., died recently.

♦ Edward Weston has joined the supervisory staff of the New York industrial arts, elementary, and junior high schools. He has been teaching in junior high schools for the past ten years. In this time he has served as a teacher of electricity.

♦ John M. Hurley, acting director of industrial-arts elementary and junior high schools, Bureau of Vocational Activities, Brooklyn, N. Y., was invited by Maurice J. Tobin, secretary of labor, to become a member of the President's Conference on Industrial Safety.

♦ Dr. Roland F. Nagel, who received his doctor of education degree from the University of Missouri at the 1952 summer commencement, and who has had experience teaching industrial arts in Iowa, Northeast Missouri State College, Kirksville, and served as a research assistant in the Department of Industrial Education at the University of Missouri, has been appointed to the department of industrial education, Northwestern State College, Natchitoches, La.

♦ Roy Clark has joined the faculty of the department of industrial education, Northwestern State College, Natchitoches, La. He is a graduate of East Texas State College at Commerce, Tex. He has had eleven years' printing experience and has served as acting head of the printing shop in East Texas State College for one year. He will have charge of graphic arts, a new area added to the industrial-arts department at Natchitoches.

♦ Irving M. Footlik, instructor in industrial engineering at Illinois Institute of Technology, has been appointed permanent secretary of the College-Industry Committee on Material Handling Education.

The committee, composed of representatives from educational institutions and industry throughout the country, has just been organized to enable engineering students to equip themselves for the future in the field of material handling.

♦ Samuel E. Harris, day trade machine-shop instructor at Sumner High School in Kansas City, Kans., received his M.A. degree last summer in the field of trade education at Hampton Institute, Hampton, Va.

♦ Anna Ziegenhagen, wife of Fred W. Ziegenhagen, principal of the Boys' Technical High School, Milwaukee, Wis., died of a heart attack on Monday, December 1, 1952.

Survivors are her husband, a son, a daughter, a sister, and a brother.

♦ Harvey Nathaniel Davis, 71, third president of Stevens Institute of Technology, Hoboken, N. J., died at seven o'clock Wednesday evening, December 3, 1952, in Roosevelt Hospital, New York City.

Dr. Davis, who retired in 1951, after 23 years as president of Stevens Institute of Technology, was operated on recently for a kidney ailment.

Dr. and Mrs. Davis lived at 42 North Mountain Ave., Montclair, N. J.

♦ Alvin Lappin, associate member, and doctoral candidate at Wayne University, is now located at Carpinteria, Calif., where he is working for the Veterans Administration.

(Continued on page 27A)

Eight Tray-Top Cintilathes at Des Moines Technical High School, Des Moines, Iowa

why top schools are turning to Tray-Tops

Tray-Top Cintilathes represent a new idea in light duty engine lathes: could an all geared head with 12 spindle speeds, large spindle mounted in three anti-friction bearings, totally enclosed quick change gear box, double walled one-piece apron, flame hardened transmission gears, direct reading speed selection, and other "high priced lathe" features be built into a genuinely low cost machine? Cincinnati Lathe and Tool Co., with advanced design skills and top-notch manufacturing facilities proved it could be done. That is why more and more forward-looking vocational schools are buying Tray-Tops. Swing sizes: 10", 12½", 15" and 18". (Flame hardened bedways available.)

Write for our latest catalog and list of schools in your area which have purchased Tray-Tops.

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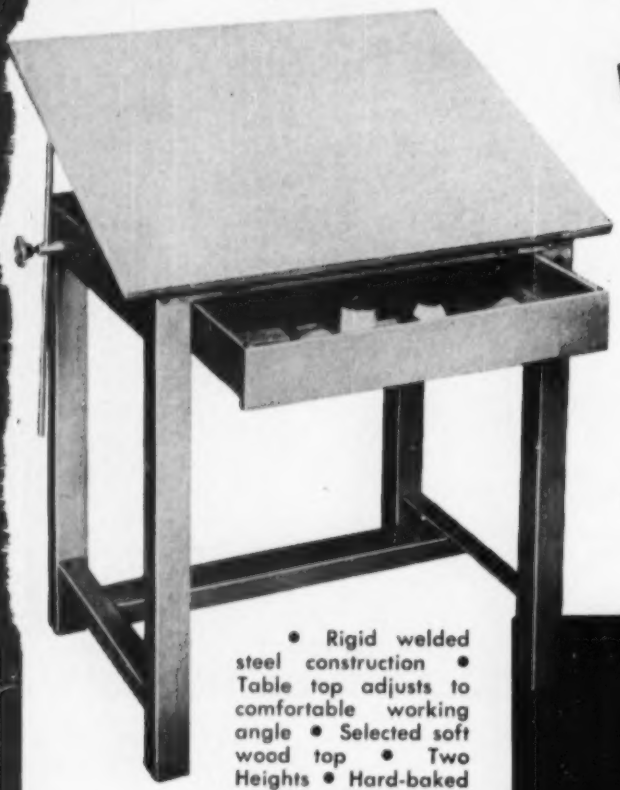


• Rigid welded steel construction • Table top adjusts to comfortable working angle • Selected soft wood top • Two Heights • Hard-baked grey hammertone enamel finish • 4 Board Sizes

STACOR

4-POST DRAWING TABLE

STACOR STAKMASTER Life-Time Steel Flat-Drawer FILING CABINETS

• Precision built • A neat, compact storage unit • Stores and protects bulky art work • Keeps paper from curling • Four and five drawer sections • Heavy guage steel welded to form • Smooth rolling ball bearing drawers • All standard sizes • Ideal for school use

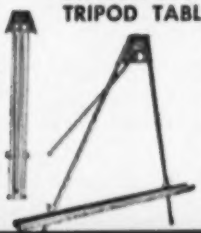
STACOR Life-Time Steel TABORETS

• Two drawers • Large cabinet section with door • Heavy gauge steel, welded to form • Recessed base or with casters for mobility

STACOR 4-Post Life-Time Steel DRAFTING TABLES

• Designed specially for engineering classrooms heavy gauge steel base • Kiln-dried Soft Wood Adjustable Top • Grey Hardbaked Enamel • Shallow & Tool Drawers with Tool tray, lock and keys

STACOR Life-Time Steel TRIPOD TABLE EASEL



• Back leg adjusts to any angle • Adjustable canvas rests • Compact for carrying • Non-skid rubber feet

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PERSONAL NEWS

(Continued from page 24A)

♦ ANDREW ALTHOUSE, supervisor of vocational education, Detroit, Mich., has been named to the committee of the Michigan State Department of Public Instruction on Education for Occupational Competence.

♦ ALTON D. HILL has been appointed director of the Racine Vocational and Adult School, Racine, Wis.

Mr. Hill spent the past seven years as a representative of American vocational education for the United States Government in Germany.

♦ DALE F. DOERING has been appointed to conduct the program in veteran training in vocational agriculture as well as classes for adult farmers at Stoughton, Wis.

♦ WEST A. BURDICK, director of the Rice Lake Vocational School, Rice Lake, Wis., has recently been elected as honorary member of Epsilon Pi Tau, national fraternity of industrial arts and vocational training educators.

♦ MERLE G. MOORE, director of education, and research and legal adviser to the Illinois Veteran's Commission since 1945, has been appointed coordinator for civil defense in Illinois schools.

♦ ERIC T. B. GROSS, professor of electric power systems engineering at Illinois Institute of Technology, has been elected national vice-president of Eta Kappa Nu association, electrical engineering honor society.

The association, with chapters at 55 colleges and universities in the United States, is the only electrical engineering honor society in the country.

♦ ELMER G. STACY, expert in rotogravure, was a member of the faculty of West Virginia Institute of Technology this summer, teaching a postgraduate course leading to the degree of master of science in printing.

Mr. Stacy, who is eastern sales manager of the Klinegrose Gravure Division of American Type Founders, has had thirty years of practical experience in printing. He has spent the past two decades in the gravure field, and has covered every phase of it from building and operating presses to engraving cylinders. He is expert in printing estimating and cost finding.

♦ ROBERT M. LEGER, instructor in electrical engineering at Illinois Institute of Technology, Chicago, Ill., has been promoted to the rank of assistant professor, effective September 1.

He joined the Illinois Tech faculty in 1949 as instructor in electrical engineering. As an assistant professor he will continue to teach radio engineering on the senior level.

♦ CHESTER A. PARKS has accepted the position of specialist in industrial education with the Institute of Inter-American Affairs in LaPaz, Bolivia, South America. It is a position with the United States Point Four program (technical assistance) for aid to underdeveloped countries. The two-year appointment became effective last May 26.

Mr. Parks was formerly supervisor and instructor of industrial arts at the State Teachers College, St. Cloud, Minn. He holds a B.S. degree from Northwest Missouri State College, Maryville, Mo.; M.A. degree from Colorado State College of Education, Greeley, Colo.; and has done graduate work at the University of Missouri.

♦ BURTON E. NELSON, president of The Stout Institute from 1923 to 1945, presented the major portion of his private library to the Stout library. The books will be available to students and faculty as Burton Nelson intended.

News Notes

♦ A new scholarship for Michigan high school seniors wishing to pursue studies in industrial arts at Western Michigan College has just been made possible through a grant from the Atlas Press Company of Kalamazoo, Mich., according to Dr. John L. Feirer, head of the industrial-arts department at Western.

The toolmaking firm will honor two students each year, presenting them with a scholarship having a total value of $500. Of this they will each receive $200 the first year and $100 each of the three remaining years, as long as they maintain a successful program in the industrial-arts department.

Any Michigan high school senior who has had at least one industrial-arts course is eligible to apply, making application to Western Michigan College. From this initial group 12 will be chosen to come to Western as guests of Atlas in the spring for a final elimination, when they appear before a three-man selection board, presenting a project or drawing completed in a high school course.

These 12, with their instructors, will tour the campus and the Atlas plant, and the final two scholarship winners will be announced that evening at the annual industrial-arts dinner.

Then the two schools having the winning students may each select an Atlas woodworking tool for the school shop. The 10 unsuccessful

(Continued on next page)

FOLLOW THESE RULES and you can't go wrong

Starrett STEEL RULES

English Pattern Rule No. 414
A general utility, tempered steel rule with easy-reading bold figures and heavy markings. Ideal for school and woodworking shops. Lengths from 1 to 6 feet.

Flexible Steel Rule No. 305
A good rule for students and apprentices with quick reading 32nds and 64ths on one side and table of fractions and decimal equivalents on the other. 6" length, ¾" wide, 3/64" thick.

Flexible Steel Rule No. 306
Similar to No. 305 except with table of letter and drill sizes on reverse side. 6" length.

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Graduated in 64ths and 32nds with tapered end for measuring in holes, slots, recesses. 6" length.

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Serves as pocket rule, hook rule or drill point gage. 6" length. Graduated with 8ths, 16ths and quick-reading 32nds and 64ths.

FREE "Helpful Information For Students and Apprentices"
A valuable aid in class instruction, written and edited especially for shop students. Write for your copy. Address Dept. CE.

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WORLD'S GREATEST TOOLMAKERS
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Buy THROUGH YOUR INDUSTRIAL DISTRIBUTOR

NEWS NOTES

(Continued from previous page)

candidates will each receive an 18-in. Power King jig saw for their own use.

♦ At Statesville, N. C., a new vocational shop is being used for the first time in the senior high school. A course in auto mechanics is being offered this year.

♦ Science and shop teachers may obtain, without cost or obligation, a 37 by 49-in. four color lithographed wall chart containing a large-scale cutaway drawing that shows how an outboard motor operates.

The cross section diagram showing the working parts of a typical outboard motor is amply large for classroom use, being more than three feet high. An operating manual, with detailed information on the operation of the motor, is sent with the chart for the guidance of teachers using it.

Requests for the charts, indicating the number wanted and the use to which they will be put, should be addressed to *Evinrude Motors, 4143 North 27th St., Milwaukee, Wis.*

♦ U. S. and Canadian patents have been granted to Homer H. Dasey of Oakmont, Pa. — covering a new plant layout method using three-dimensional models as a planning medium, coupled with a photo film two-dimensional templet.

The film templet, used in conjunction with a film grid sheet, makes it possible to secure Ozalid or blueprints directly from the three-dimensional layout. All layout and lettering time is eliminated and prints are standardized by this patented method of plant layout.

The patents have been assigned to "Visual" Planning Equipment Co., Inc., of Oakmont (Alleg. Co.), Pa.

NEW ADDITION TO MADISON TOWNSHIP (OHIO) SCHOOL DEDICATED

Madison Township's new half-million-dollar school addition was dedicated recently. The new addition includes a gymnasium-auditorium; industrial arts, vocational agriculture, and home-economics departments, and soundproofed practice rooms for instrumental music.

Supt. Herman M. Martin said the addition will eventually be joined with the older building on the Groveport site by a covered corridor.

Classes have been moved into the new section as fast as possible since the September term began.

UNIVERSITY OF MICHIGAN LAUNCHES AN EXPANDED PROGRAM OF INDUSTRIAL-ARTS TEACHER EDUCATION

With the opening of the fall semester, the University of Michigan is going into an expanded program for the preparation of industrial-arts teachers. The enlarged program gives particular emphasis to the upgrading of industrial-arts teachers through graduate study; this may include formal courses, special institutes, and consultant service. Four members of the faculty of the School of Education will have the major responsibility for the program; they are Dr. Frank W. Dalton, Lawrence Borosage, Howard Gerrish, and Professor Ralph C. Wenrich.

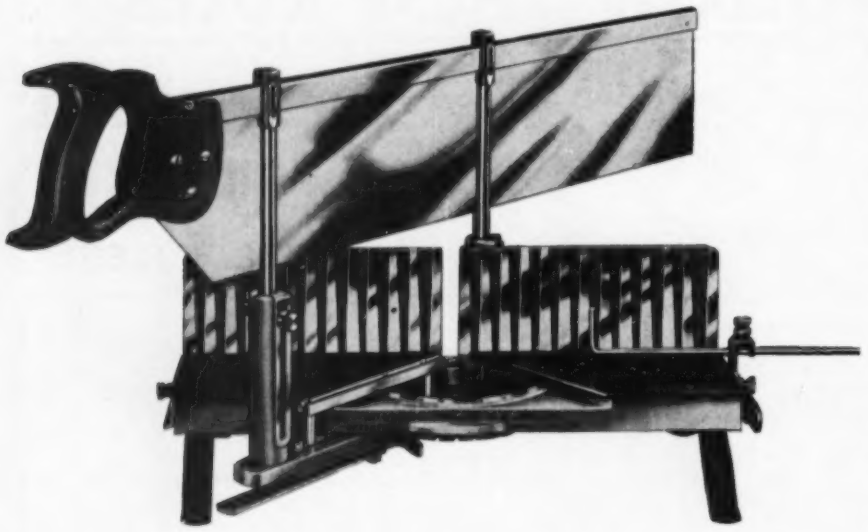
During the fall semester, Messrs. Dalton, Borosage, and Wenrich will each teach a course for industrial-arts teachers in Grand Rapids, Detroit, and Flint, respectively. The course to be offered in these Graduate Centers is E220, "Current Concepts in Industrial-Arts Education" — a course designed to provide a critical analysis of the role of industrial arts in the evolving program of education. Special consideration will be given to the application of biological, psychological, and sociological concepts and the research which underlies modern educational thought.

Dr. Dalton has been both a teacher and supervisor of industrial education; during the five years he was state supervisor of industrial education, he maintained his interest in the development of industrial arts throughout the state, by participation in many industrial-arts activities on a state level. He has been a teacher trainer in industrial education for the past 12 years and a member of the state advisory committee in industrial arts.

Mr. Borosage, a newcomer to the staff, joined the faculty at the university in 1951, coming from the Ohio State Department of Education where he was responsible for supervising and providing leadership in industrial education. During the war period, he served on the training staff at the Curtiss Wright Corporation. He began his teaching career as a shop teacher at the Stout Institute and the Menomonie public schools. His undergraduate and graduate studies were done at the Stout Institute and the Ohio State University.

Early in his professional career, Prof. Wenrich taught industrial arts in the secondary schools of Pennsylvania. Later he was a state supervisor in Pennsylvania, and just prior to coming to the university in 1950 he was associate superintendent of public instruction with particular responsibility for vocational education and the practical arts.

(Continued on page 30A)



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For generations the favorite in schoolshops and first choice with professionals — Millers Falls Langdon Acme is now even better than ever. Its redesigned, one-piece bed and back give much greater strength and are precisely milled for greater accuracy. Three "Oilite" bronze bearings in each saw guide mean easier work, smoother saw travel. New, steel saw guides and carriage assure longer wear with continuing accuracy. These and many other tested refinements make this new Langdon Acme more than ever the finest mitre box made and the best value you can buy for your schoolshop. Ask your supplier for full information about the new, improved Langdon Acme or write direct.

"THE WORLD'S MOST FAMOUS MITRE BOX"

MILLERS FALLS TOOLS SINCE 1868

MILLERS FALLS COMPANY GREENFIELD MASS.

Sound Projector "Gremlin" Identified!

"No problem with Pageant," say experts

"... I'd like to have a dollar for every projector that has come back here for repairs because of faulty lubrication. People who are buying permanently prelubricated Kodascope Pageants are among my most satisfied customers ..."

Edward H. Stevens
Stevens Pictures, Inc., Atlanta, Georgia

"... We are glad to get on your 'band wagon' because the Pageant is an outstanding projector in many ways. When we can sell a man a projector that gives such fine performance with practically no maintenance, it goes a long way towards building new business ..."

Frank C. Vydra
Vydra Visual, Chicago, Illinois

"... One of the biggest problems in any high-speed running mechanism is lubrication under variation of temperatures ... Thank heavens your Kodak engineers were farsighted enough to see the points of lubrication so the user cannot and does not have to lubricate the Pageant ..."

H. Gregg, *Sales Manager*, AVA Dept.
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"... A projector which has been prelubricated at the factory can never fail for lack of lubrication due to negligence or oversight of the operator. The Kodascope Pageant Projector thus gives a better than normal promise of long, uninterrupted service because it has been prelubricated for life."

M. L. Stoeppelwerth, *President*
Indiana Visual Aids Co., Inc., Indianapolis, Ind.

"... Our sincere congratulations to Eastman on at long last building the first 16mm. sound projector on the market with *permanent prelubrication and requiring no oiling by the owner.* What a wonderful improvement in 16mm. sound projector design!"

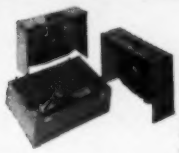
J. M. Stackhouse
J. M. Stackhouse Co., Richmond, Virginia

"... Any way you look at it, a projector that doesn't require oiling offers a big benefit to the schoolman operating on a tight budget. That's why we recommend the Pageant, since it's permanently prelubricated and cuts down service costs ..."

Arnold Watland
Watland Brothers, Blue Island, Illinois

Kodascope *Pageant* Sound Projector lists at only $400

Complete in one case with single speaker for classrooms and small auditoriums.



Multi-Speaker Unit

adds three extra speakers for large auditoriums or to overcome poor acoustical conditions. Lists at only $92.50.

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So before you buy your projectors, ask your Kodak Audio-Visual Dealer to demonstrate the Pageant. See for yourself how easy it is to thread and operate ... how brilliantly it screens your films ... how naturally it reproduces sound at all-volume levels ... how compact and easy it is to carry and set up. By any standard of comparison, you'll find it tops!

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Please send me information on:* ☐ *the 16mm. Kodascope Pageant Sound Projector;* ☐ *the Kodak Multi-Speaker Unit.

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NEWS NOTES

(Continued from page 23A)

He is now chairman of the department of vocational education and practical arts in the school of education.

Mr. Gerrish came to the university this fall from Algonac, Mich., where he has taught industrial arts for the past five years. Mr. Gerrish had a rich experience in business and industry as well as four years of military service before entering the teaching profession; he was a captain in the U. S. Army, serving as an artillery liaison pilot. He will perform many of the functions previously performed by Marshall L. Byrn who passed away last fall. In addition to teaching University High School classes, it is planned for Mr. Gerrish to do some demonstration research in the industrial-arts laboratory. He will also teach professional courses in the school of education during the summer session.

TEXAN WINS DELTA SCHOOL CONTEST

A high light of the American Vocational Association Convention held in Boston during the first week of December was the awarding of the coveted $1,000 Grand Award in the Delta School Shop Planning Contest to Anton M. Sevcik, industrial-arts instructor of El Campo, Tex. Sevcik won his prize, a selection of $1,000 worth of Delta power tools, for submitting the soundest plan for a high school general shop. It was the outstanding plan of the six levels of instruction on which the contest was based.

Divisional Award winners were: Division One — Elementary School, Armand G. Rehn, director of practical arts, Board of Education, Newark, N. J.; Division Two — High School, E. H. Miller, instructor of industrial arts, Jal Public Schools, Jal, N. Mex.; Division Three — Junior High School, Howard Sherman, student, State Teachers College, Oswego, N. Y.; Division Four — Senior High School, Joseph A. Williams, industrial arts teacher, Lovejoy High School, Lovejoy, Ill.; Division Five — Technical High Schools, Edward Saks, instructor, foundry practice, Murrell Dobbins Vocational School, Philadelphia; Division Six — Technical Institutes, G. Edwin Shofner, head, drawing and design department, William R. Moore School of Technology, Memphis.

Anton M. Sevcik, left, grand award winner of Delta's School Shop Planning Contest, receives Certificate of Attainment at AVA Convention in Boston from R. P. Melius, a vice-president of Delta Power Tool Division, Rockwell Mfg. Co., Pittsburgh, Pa. As winner of the grand prize Mr. Sevcik will select $1000 worth of Delta Power Tools

His prize was the top one of 37 awarded in the contest. In addition to Sevcik's award, there were six Divisional Awards of $350 worth of Delta power tools for each winning contestant who submitted the best school shop plan in his division.

♦ Civil Defense Communication activity in Iowa has made the Radio Department, Industrial Arts Department, at the Iowa State Teachers College, an alternate station in the control of a 60-ft. tower, and rotating array has been added to the physical equipment. Mr. Matala, assistant professor in the department, is in charge. The call letters are WPGJ. The boys are on the air each noon with the Iowa Net Operators. A number of schools are represented in this organization and the work is in charge of their industrial-arts teachers.

♦ Four engineering student winners of the second annual national scholarship contest, sponsored by the American Society of Tool Engineers, are:

Merton L. Bartsch, senior in engineering at the University of Minnesota; Hearst McClellan, mechanical engineering senior at the University of Cincinnati; Raymond F. Perner, mechanical engineering senior at the University of Texas; and David Lee Poli, industrial engineering senior at the Ohio State University.

♦ A complete guide of spray painting titled, "Spray Painting Made Easy," for hobbyists, homeowners, craftsmen, and others has been pub-

(Continued on page 32A)

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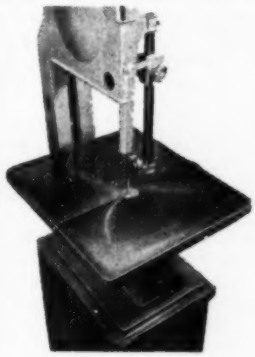

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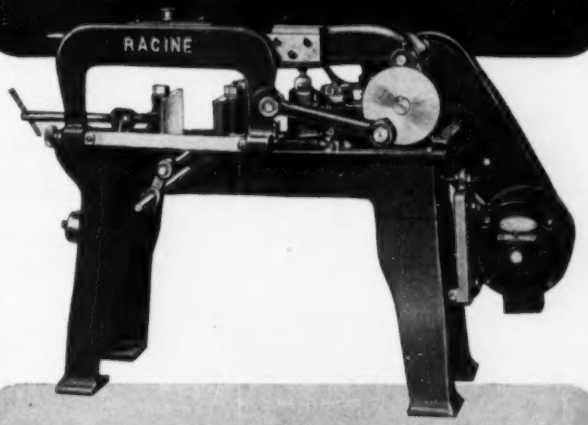

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NEWS NOTES

(Continued from page 30A)

lished by the DeVilbiss Co., Toledo, Ohio, manufacturers of spray-painting equipment.

The booklet which sells for 35 cents may be obtained direct from the *DeVilbiss Co., 300 Phillips Ave., Toledo 1, Ohio,* or from dealers handling DeVilbiss products.

♦ President Walter W. Parker of Southeast Missouri State College, Cape Girardeau, Mo., has authorized a capital outlay of funds to equip a new industrial-arts laboratory for machine woodworking and to revise existing facilities of the composite general shop. Major changes in wiring, machine installation, and storage facilities will be completed during the fall, winter, and spring terms.

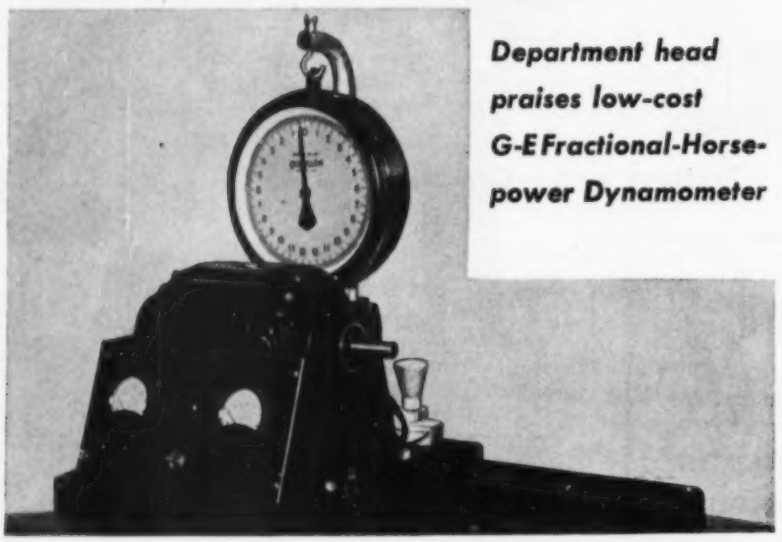
Professor Amos G. William's class in content and methods has completed detailed floor plans for the organization and shop planning phase of the current expansion.

The reorganized department at Cape Girardeau will have four laboratories consisting of a large composite general shop, a unit woodworking shop, a machine shop, and a large drafting room. Full attic storage is available and a departmental working library is conveniently located between instructors' offices.

♦

Fire caused 6500 people to die, 5000 of them from fires in the home. — *The National Safety Council.*

"One of Our Outstanding Pieces of Equipment!"



Department head praises low-cost G-E Fractional-Horsepower Dynamometer

L. J. Sitterlee, Head of Dept. of Electrical Technology, Institute of Applied Arts and Sciences, State University of New York, says: "We feel that the small G-E dynamometer is potentially one of our outstanding pieces of equipment. We are able to demonstrate principles that are usually done on machines costing much more. It is small, compact, and versatile.

"By using a variety of motor mounts we are able to test quickly, and accurately, any type fractional-horsepower motor. Since the instruments and load are mounted on the dynamometer frame, the auxiliary equipment is reduced to a minimum. The self-contained dynamometers are ideally suited for small motor repair shops as well as laboratories."

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GENERAL ELECTRIC

687-68

New Publications

Basic Mathematics for Engineering and Science

By Walter R. Van Voorhis and Elmer E. Haskins. Cloth, 619 pp., 5½ by 8½ in., $5.75. Prentice-Hall, Inc., Publishers, New York City.

The authors of this book have attempted to blend college algebra, trigonometry, and analytic geometry into a unified subject which would be helpful to students of engineering, physics, chemistry, and mathematics.

The material in the book has been thoroughly tested in the classroom, and examples are given of how to apply the mathematical concepts to problems arising in science and engineering.

Gears: Spur, Helical, Bevel and Worm

By P. S. Houghton. Cloth, 390 pp., 6¼ by 9 in., illus., $11.75. Anglobooks, 475 Fifth Ave., New York 17, N. Y.

An English publication that will be found very useful by engineering students, draftsmen, machinists, and inspectors.

The mathematics in the book is fully explained by worked-out examples showing how to apply the formulas required by the various types of gears.

The method of designing and cutting the gears also is explained, together with the mathematics of inspection and measuring.

Workshop Practice

By E. Pull. Revision by P. S. Houghton. Cloth, 739 pp., 5 by 7½ in., illus., $5.50. Anglobooks, 475 Fifth Ave., New York 17, N. Y.

The ninth and revised edition of an English publication. The subject is thoroughly covered and it explains the use of hand and power tools, the materials and processes used by the machinist, how heat treating is done, and drop forging, stamping, and welding.

Modern Coach and Motor Trimming

By J. D. McLintock. Cloth, 92 pp., 5⅝ by 8¼ in., illus., $2.50. Anglobooks, 475 Fifth Ave., New York 17, N. Y.

An English publication which presents an interesting dissertation on the subject of automobile trimming taking into consideration both production methods and those used by the jobbing trimmer.

The book is intended for both students and craftsmen.

Manual for Ford Owners

By C. E. (Ed) Packer. Cloth, 304 pp., 5⅞ by 8¼ in., illus., $3.50. Popular Mechanics Press, Chicago, Ill.

A manual telling the owner how and why his automobile works or does not work, and what he can do about it himself.

The 22 chapters present descriptive and pictorial material on the sources of electrical energy, spark plugs, the ignition system, the starting motor, how to repair the generator, regulator service, lighting service, the fuel system, engine maintenance, lubrication, cooling system, tune-up, clutch adjustment, synchromesh transmission, overdrive, Fordomatic transmission, rear axles, brake adjustment, and wheel alignment.

Ford specifications for 20 years also are given.

(Continued on page 35A)

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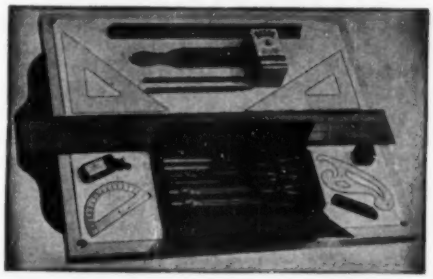

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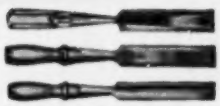

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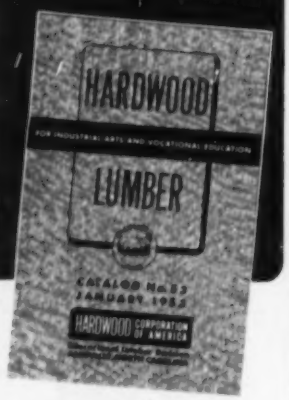

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NEW PUBLICATIONS

(Continued from page 32A)

Everyone Can Paint Fabrics

By Pearl F. Ashton. Cloth, 163 pp., 6¼ by 9¾ in., illus., $3.95. The Studio Publications, Inc., in association with Thomas Y. Crowell Co., New York and London.

A useful book which will be found interesting and helpful by the beginner.

It presents the history of the different ways of applying designs to cloth, the equipment needed for freehand painting and stenciling, explains how to use color and gives many suggestions to help the beginner decide on what he should attempt in the way of projects to make and paint.

There is also a chapter on designing and using stencils.

Principles of Electricity

By Wendell H. Cornetet. Cloth, 341 pp., 6¼ by 9¼ in., illus., $4. McKnight & McKnight Publishing Co., Bloomington, Ill.

This is the second edition of this text designed for students in secondary schools, and trade schools, who desire to acquire a grasp of the basics of electricity and electronics.

The book contains many experiments which will assist the learner in getting a good understanding of the practical application of electricity.

The ten chapters into which the book is divided cover magnetism; static electricity; Ohm's law; electrical currents and chemical action; energy, work, power; electricity and magnetism; electrical meters; d.c. and a.c. motors and dynamos; and electronics at work.

Public Affairs Pamphlets

No. 32. The Cooperatives Look Ahead, by Jerry Voorhis.

No. 188. Working Wives and Mothers, by Stella B. Applebaum.

Paper covers, 32 pp., 5⅜ by 8⅜ in., illus., 25 cents each.

These booklets are published by the Public Affairs Committee, Inc., 22 East 38th St., New York 16, N. Y.

United States Government Publications

Your Skill Improvement Program. Paper, 12 pp., 5¾ by 9 in., illus., 15 cents.

Atomic Energy Commission — Tenth Semiannual Report. Paper, 151 pp., 5¾ by 9⅛ in.

The National Apprenticeship Program. Paper, 30 pp., 5¾ by 9 in.

Write for copies of these booklets to Superintendent of Documents, United States Government Printing Office, Washington 25, D. C.

Education Directory 1951–52 — Part 2, Counties and Cities

Prepared by the Administration Branch, Division of State and Local School Systems, Office of Education, 1952, 89 pp., 25 cents. For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

Listed in Part 2 of the *Education Directory* are:

Superintendents of counties, supervisory districts or unions, and urban schools, by States; and

Superintendents of parochial schools.

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—says IRA MADDEN, Woodshop Teacher at Isaac Crary School, Detroit

● "For four years now, students in my classes have been participating in I.A.A. The enthusiasm they have shown for their classwork in connection with I.A.A. is without equal in all my years of teaching. We're already underway with our 1953 I.A.A. entries!"

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Teachers whose students win Outstanding Achievement Awards will be invited, expense-free, as 3-day guests of Ford Motor Company in Detroit. They will visit Ford's assembly line at River Rouge, the Henry Ford Museum, Greenfield Village, and other points of interest.

Tell your students about the 1953 I.A.A.!

Full information and entry blanks will be sent to you, on your request to:

INDUSTRIAL ARTS AWARDS
FORD MOTOR COMPANY
2936 Schaefer Road, Dearborn, Michigan

SHOP EQUIPMENT NEWS

REFLECTING ON AVA COMMERCIAL EXHIBITS

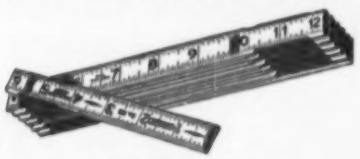
The commercial exhibits at the forty-sixth annual convention of the AVA, at Boston, were housed in the armory of the First Corps Cadets, which was organized in 1741. The first succeeding war in which America participated made use of the First Corps Cadets Armory to furnish its full quota of well-trained officers and men, properly instructed in the use of the weapons and tools of war.

It may be providential that the AVA should give those shop instructors fortunate enough to attend the Boston convention, an opportunity to become acquainted with the best weapons and tools of industrial education in this same historical building so successful in preparing men to fight our battles for freedom and democracy. The sales representatives of the commercial exhibitors are expert instructors in the proper use of the tools of industrial education, so necessary to our national economy and defense. Those supervisors and instructors, who could not attend the Boston commercial exhibits, are the losers, because industrial education, as we know it today, would be impossible without the manufacturers serving it.

All manufacturers reported that they are in a better position than last year for deliveries, but urged early requisitions to prevent delays in filling orders for some few items. — *John F. Faber.*

A NEW STANLEY RULE

Stanley Tools announces a new Green End folding rule, No. 126, which incorporates important new features. Working from the short



Stanley 126 Rule

leg end, each additional leg extended forms a longer measuring stick. Example: 6 in., 1 ft., 1 ft. 6 in., 2 ft., 2 ft. 6 in., etc., for end-to-end measurements. Opened from the long leg end of the rule, the extended sticks may be hooked over work — gauging even measurements in 6-in. units. Square ends on each stick butt squarely with work for accurate scribing, making the 126 a compact, pocket-sized marking gauge at 2 in., 4 in., 6 in., 10 in., 12 in., etc. The time-saving uses stem from a revolutionary form of marking so that every joint opens on an *even* number — instead of an odd number like the usual rule, and each stick has square ends, rather than rounded. Big plastic coated figures last four times longer; grease, grit, and dirt wipe right off without decline in the readability of figures and graduations. Other quality features include select rock maple sticks, and "ball-lock action" joints.

For further information contact *E. C. Benfield, Stanley Tools, New Britain, Conn.*

For brief reference use IAVE — 0201.

NEW DI-ACRO PUNCH PRESS

Two new power operated punch presses, each with a rated capacity of five tons, have just been added to the Di-Acro line manufactured by O'Neil-Irwin Manufacturing Company. Both presses will punch a 4-in. diameter hole in 16-gauge (.062-in.) sheet steel or a ⅜-in. hole in ⅜₁₆-in. steel plate.

A feature of these two Di-Acro Power Punch Presses No. 1 and No. 2 is their deep throat. Because of this, many operations can be performed on them that could not be done on shallow, bench type presses. Di-Acro Power Punch Presses are similar in construction characteristics to the manually operated Di-Acro Punch Presses which have been on the market for a number of years. Any Di-Acro hand operated punch press now in use can be converted to power if it is desired, the manufacturer advises.

New power operated Di-Acro Punch Press

The flywheel on these machines is driven by a half-horsepower electric motor. Choice of a single-phase 110-220 volt, or a three-phase 220-440 volt, a.c. motor is offered.

For further information write to *O'Neil-Irwin Mfg. Co., 544 Eighth Ave., Lake City, Minn.*

For brief reference use IAVE — 0202.

COLUMBIAN ALUMINEDGE NO. 648-AB, 48 in. MASONS' LEVEL

A new 48-in. aluminum-bound Masons' Wood Level, possessing unusually long life and accuracy under heavy-duty conditions, is announced by The Columbian Vise & Mfg. Co.

Known as Columbian "Aluminedge" No. 648-AB, the new level has 4 plumbs and 2 level vials. It is made of clear California kiln-dried sugar pine, polished and coated with clear varnish.

The No. 648-AB level is completely enclosed with aluminum on every edge. Binding is of a new precision-rolled aluminum type into which the wood stock is fitted and sealed. Further adherence is assured by fastening with 6 recessed-head Phillips screws on both top and bottom surfaces. The ends are machined flush and anchored by 2 screws.

Another feature is the use of "metallic-sealed" vials which eliminate use of the conventional glass drawn tips, and greatly increases level life and accuracy. Vials are enclosed in a new type plastic ring which affords further protection against breakage and gives maximum light reflection for easy reading.

For further information, write to *The Columbian Vise & Mfg. Co. 9023 Bessemer Ave., Cleveland 4, Ohio.*

For brief reference use IAVE — 0203.

NEW ELECTRIC VAPOR DEGREASER

The Wallace DG-1 Degreaser provides many features not previously available in the vapor-degreasing field.

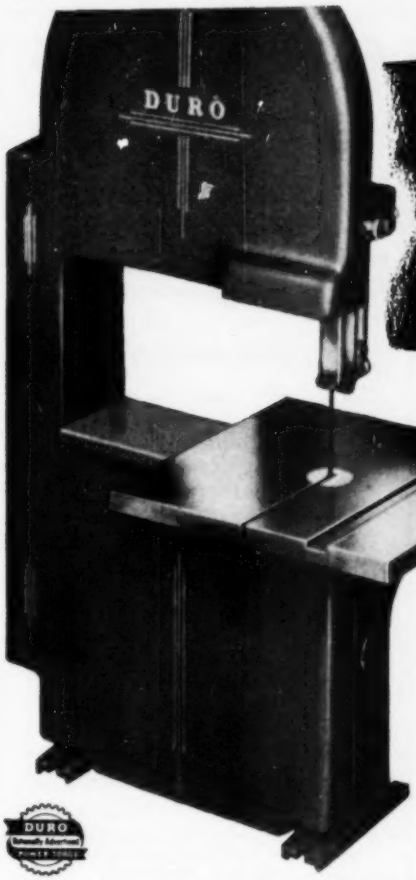
It is electrically operated, insulated, thermostatically controlled, and ready for use in a fraction of the time ordinarily required.

Wallace DG-1 Degreaser

Provided with either a 110- or 220-volt heating element, it is ready for instant plug-in operation. Heat-up time is less than 20 minutes, and requires only 2½ gallons of solvent. The manufacturers noninflammable Xsol solvent vaporizes, at a higher moisture-dispelling temperature, and this coupled with a hot-dip galvanized steel tank practically eliminates rusting and corrosion problems common with water-cooled units.

The caster-mounted base and plug-in feature makes portable operation practical. The thermostatic control maintains a constant vapor level and prevents overheating.

(Continued on page 38A)



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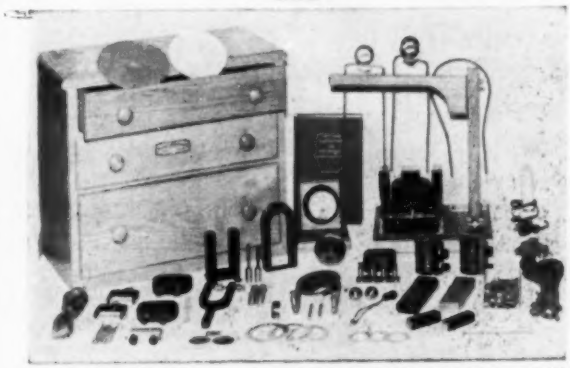

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SHOP EQUIPMENT NEWS

(Continued from page 36A)

With the Wallace DG-1 Degreaser, greasy parts and assemblies come out clean, dry, and film-free in a matter of seconds.

For bulletins and prices write to *J. D. Wallace & Co., 140 S. California Ave., Dept. IA, Chicago 12, Ill.*

For brief reference use IAVE — 0204.

WILLIAMS FEELER GAUGES

An assortment of 27 sizes of Feeler Gauge Blades, 10 Feeler Gauge Sets have been added to the J. H. Williams & Co. line.

All blades are made from selected Swedish steel properly tempered. Each blade is electro-etched with its decimal size and is treated with rust resistant oil. Individual blades from .0015 to .040 in. are packaged 6 to an envelope and are available in 3½-in. and 12-in. lengths.

Feeler gauges are also available in a variety of sets containing combinations of sizes for special use. Sets have knurled lock nuts which allow the user to select the required blade size and then lock it into position.

For further information address *J. H. Williams & Co., 400 Vulcan St., Buffalo 7, N. Y.*

For brief reference use IAVE — 0205.

UTICA TOOLS ON T.V.

Utica Drop Forge & Tool Corporation, manufacturers of Utica pliers and adjustable wrenches, are sponsoring the "Handiman and Home Gardener Show" on American Broadcasting Company, WJZ-T.V., featuring Phil and Ruth Alampi.

Through the medium of television, the Alempis not only tell about Utica pliers and adjustable wrenches, but they also give "live" demonstrations of exactly how and at which jobs the various tools are used to best advantage.

For further information contact *Utica Drop Forge & Tool Corp., Utica 4, N. Y.*

For brief reference use IAVE — 0206.

YATES-AMERICAN MACHINE COMPANY ACQUIRES THE BIG FOUR CARBIDE TOOL COMPANY

Yates-American Machine Company has announced its acquisition and transfer to Beloit, Wis., of the manufacturing facilities of Big Four Carbide Tool Company, a Cincinnati manufacturer of "Big Four" carbide tipped saws and other carbide tipped cutting equipment. With this new addition Yates-American will be in a position to supply a complete line of cutting equipment for all woodworking needs.

The carbide tipped saw has a marked superiority over conventional saw equipment, both as to the quality of its work and its extremely long life. This type of saw is a necessity in the cutting of wood substitutes, compositions, plastics, etc. The saw can be furnished in a patented "New Design" type, as well as in the increasingly popular "Safety" type cut controlled saw.

A special type of carbide tipped saw is available to the metal trades, for cutting copper, brass, aluminum, magnesium, and special alloys.

For complete information on carbide tipped saws write to *Yates-American Machine Co., Beloit, Wis.*

For brief reference use IAVE — 0207.

(Continued on page 40A)

GOOD TOOLS
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You'll take your Morgan woodworking vises for granted as soon they've been installed in your shop. They're built for years and years of trouble-free service under the most difficult of student treatment. . . . Never out-of-order, never fail to hold firmly and accurately, never a doubt in the student's or teacher's minds that they'll do the job. That's why Morgan woodworking vises are the most popular of all the fast-selling Morgan vise line.

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SHOP EQUIPMENT NEWS

(Continued from page 38A)

A. B. DICK LITHOGRAPH COTTON PADS

A. B. Dick Company, Chicago, announces a new product, the A. B. Dick lithograph cotton pads. These pads make it easy to apply etch and gum solutions in preparing lithograph plates for offset duplicating.

They are of nonwoven fabric and approximately 3¾ by 4¼ in. in size, and may be folded in half or in quarters for convenience in use. Because they are nonabrasive they will not scratch or mar plates, and they are lint-free; hence, there are no specks or fibers to contaminate the rollers. Each pad absorbs just enough solution with one application to etch both thoroughly and economically, and each pad, refolded, provides extra surfaces for additional applications.

The firm also has made available the cotton pad dispenser, which accommodates a full package of 100 cotton pads.

For further information address *A. B. Dick Co., 5700 W. Touhy Ave., Chicago 31, Ill.*

For brief reference use IAVE — 0208.

C. G. BIGWOOD, VICE-PRESIDENT OF THE L. S. STARRETT COMPANY, DIES

Clifton G. Bigwood, vice-president in charge of operations, and director of The L. S. Starrett Company, died suddenly on December 8, 1952, after 36 years of service to the firm.

Mr. Bigwood, who started with the company in the tool and machine room on May 1, 1916, came up from the ranks through successive positions of methods engineer, assistant superintendent, assistant vice-president, and recently was elected vice-president in charge of operations and director.

He was a member of the North Central Massachusetts Chapter of The American Society of Tool Engineers, and a former member of the Athol Housing Authority and Advisory Board.

CATALOG FOR WOODWORKERS

Craftsman Wood Service Company, in its Hunt's Catalog No. 18, offers woodworkers an interesting and quite complete 144-page booklet containing numerous illustrations and clear explanations on types and uses of woods and veneers, inlays and overlays, inlay bandings, moldings, wall paneling, finishing materials, tools, project books, hand and power woodworking tools, and hardware and furniture items.

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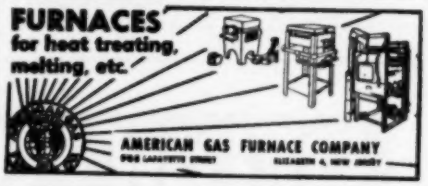

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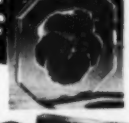

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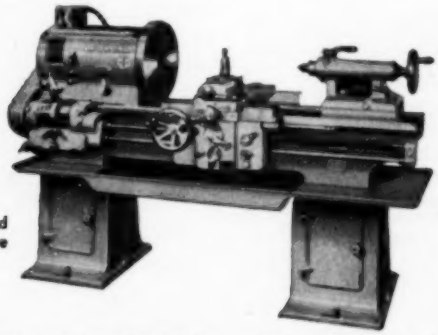

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